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Contents

Articles

Departments

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INDIA RUBBER WORLD

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Census Facts Afford Profit Possibilities to the Rubber Industry

Vergil D. Reed [1]

FACTS at your finger tips! Do you realize that valuable facts for your industry are available for the asking? Perhaps you are missing some profit possibilities of which you are not aware. A great deal of statistical data pertinent to the successful operation of companies in the rubber industry is not available from individual company records or from trade associations. Neither can individual companies afford to collect it. Therefore the Census Bureau and other federal agencies, such as the Bureau of Foreign and Domestic Commerce, the Patent Office, and the Bureau of Standards are endeavoring to supply as many of these needed data as possible.

Federal censuses have been including the collection of statistics on the rubber manufacturing industry since 1849. From this year to 1899, inclusive, statistics were gathered every ten years, from 1904 to 1919 every five years, and from 1921 to 1935 every two years.

[1] Assistant director, Bureau of the Census, Department of Commerce, Washington, D. C.

THE selection of statistics which will be of greatest value to the readers can only be accomplished by the closest cooperation between the reader and the statistician so as to insure a clear understanding of the interpretive possibilities when considering the available information.

Although there are some limitations as to data possible of collection, the efforts of the compiling agency can be guided by constructive advice from the rubber industry along such lines as the final question to which an answer is desired, the plan of presentation most readily usable, the period of time most applicable, or the degree of article classification necessary to give the type of information required.

The accuracy or authenticity of compiled data can only be dependable if the sources of information are reliable and will conscientiously supply true information, and in case of doubt as to its reliability, indication should be given as to any such doubt.

The suggestion is made that the rubber industry make use of such information as is available at the Bureau of the Census of the Department of Commerce, evaluate it as to its effectiveness in satisfying the needs, and then make constructive suggestions as to any possible improvement in the method of presentation.

Before making such suggestions, however, each individual should take inventory as to the contribution which he has or has not made toward the statistical data and consider his own personal ability to augment more effectively the efforts of the Bureau of the Census.

The 1935 preliminary report on rubber products released on January 4, 1937, by the Manufactures Division, gives the following comparative statistics for the industry.

For the group as a whole it will be noted that "cost of materials, containers, fuel, and purchased electric energy" has increased at a more rapid rate that any other item from 1933 to 1935, and also that "value added by manufacture" in 1935 did not approach the 1929 figure as closely as did the other items.

Glancing down the table we see that the industry has been divided into three sub-industry groups: Rubber Tires and Inner Tubes, Rubber Boots and Shoes, and Rubber Goods Other than Tires, Inner Tubes, and Boots and Shoes. All the 1935 figures for each group (except number of wage earners in the rubber boots and shoes group) increased appreciably over the 1933 figures, but in no case did they approach the 1929 level. Of the three groups, Other Rubber Goods came the closest to

SUMMARY FOR THE INDUSTRIES: 1935, 1933, AND 1929*

	1935	1933	1929	% of Increase or Decrease (—): 1933 to 1935	% of Increase or Decrease (—): 1929 to 1935
The Group as a Whole:					
Number of establishments	465	408	525	14.0	—11.4
Wage earners (average for the year)†	114,612	106,283	149,148	7.8	—23.2
Wages‡	$133,659,754	$99,116,552	$207,305,857	34.9	—35.5
Cost of materials, containers, fuel, and purchased electric energy‡	$368,478,339	$211,396,716	$578,677,681	74.3	—36.3
Value of products‡	$677,437,237	$472,743,587	$1,117,460,252	43.3	—39.4
Value added by manufacture§	$308,958,898	$261,346,871	$538,782,571	18.2	—42.7
Rubber Tires and Inner Tubes Industry:					
Number of establishments	42	44	91	¶	¶
Wage earners (average for the year)†	57,128	52,976	83,263	7.8	—31.4
Wages‡	$78,253,489	$54,737,313	$127,081,975	43.0	—38.4
Cost of materials, containers, fuel, and purchased electric energy‡	$265,515,401	$139,392,070	$429,606,971	90.5	—38.2
Value of products‡	$446,091,602	$299,313,263	$770,176,890	49.0	—42.1
Value added by manufacture§	$180,576,201	$159,921,193	$340,569,919	12.9	—47.0
Rubber Boots and Shoes Industry:					
Number of establishments	12	13	22	¶	¶
Wage earners (average for the year)†	17,246	18,102	25,659	— 4.7	—32.8
Wages‡	$16,113,490	$14,440,403	$29,945,265	11.6	—46.2
Cost of materials, containers, fuel, and purchased electric energy‡	$20,729,996	$14,124,109	$34,396,466	46.8	—39.7
Value of products‡	$53,162,121	$42,018,877	$102,537,625	26.5	—48.2
Value added by manufacture§	$32,432,125	$27,894,768	$68,141,159	16.3	—52.4
Rubber Goods Other Than Tires, Inner Tubes and Boots and Shoes Industry:					
Number of establishments	411	351	412	17.1	— 0.2
Wage earners (average for the year)†	40,238	35,205	40,226	14.3	**
Wages‡	$39,292,775	$29,938,836	$50,278,617	31.2	—21.8
Cost of materials, containers, fuel, and purchased electric energy‡	$82,232,942	$57,880,537	$114,674,244	42.1	—28.3
Value of products‡	$178,183,514	$131,411,447	$244,745,737	35.6	—27.2
Value added by manufacture§	$95,950,572	$73,530,910	$130,071,493	30.5	—26.2

* Because they account for a negligible portion of the national output, plants with annual production valued under $5,000 have been excluded since 1919.

† Not including salaried officers and employes. The data for such officers and employes will be included in a later report. The item for wage earners is an average of the numbers reported for the several months of the year. In calculating it equal weight must be given to full-time and part-time wage earners (not reported separately by the manufacturers), and for this reason it exceeds the number that would have been required to perform the work done in the industry if all wage earners had been continuously employed throughout the year. The quotient obtained by dividing the amount of wages by the average number of wage earners cannot, therefore, be accepted as representing the average wage received by full-time wage earners. In making comparisons between the figures for 1935 and those for earlier years the possibility that the proportion of part-time employment varied from year to year should be taken into account.

‡ Manufacturers' profits or losses cannot be calculated from the census figures because no data are collected for certain expense items, as interest, rent, depreciation, taxes, insurance, and advertising.

§ Value of products less cost of materials, containers, fuel, and purchased electric energy.

¶ % not computed where base is less than 100.

** Less than one-tenth of 1%.

reaching the 1929 figures.

These preliminary releases also give comparative figures for 1935, 1933, and 1929 for products, by kind, quantity, and value for the three industry groups. Figures for crude and reclaimed rubber consumed by the industry as a whole are also cited. As it is to be expected, with but few minor exceptions, this additional information shows the same general recovery as the group as a whole.

The breakdown of data, by states, has not yet been released for 1935, but may be published in the final volume. The Manufactures Volume for 1933 shows that there were 15 Rubber Tire and Inner Tube establishments in Ohio, employing, on the average, 35,621 wage earners and producing goods valued at $188,617,000, which was 63% of the total value of rubber tires and inner tubes produced in the United States during that year. Five establishments were primarily engaged in manufacturing rubber boots and shoes in Massachusetts in 1933. These five employed an average of 6,678 wage earners and produced goods valued at $18,292,000, 44% of the total for the United States. New Jersey led in producing Rubber Goods Other than Tires, Inner Tubes, and Boots and Shoes with 40 establishments employing an average of 7,162 wage earners and producing goods valued at $25,936,000, or 20% of the total for this group.

In the 1929 census, the most complete of all the censuses to date, data were published for carbon black, zinc oxide, sulphur, tire fabrics, hose and belting duck, other cotton fabrics, and fabrics other than cotton, all important materials consumed by the rubber industry. No figures on these commodities were published in 1931 or 1933, or will they be included in the 1935 report. According to 1929 census figures, there were 168,888,558 pounds of carbon black, costing $13,135,352 used in the industry (Rubber Tires and Inner Tubes Group used 151,525,017 pounds, Rubber Boots and Shoes, 1,491,744 pounds, and Rubber Goods Other than Tires, Inner Tubes, and Boots and Shoes, 15,871,797 pounds). The same year 133,675,413 pounds of zinc oxide, costing $9,148,622, was used by the industry; 61,296,703 pounds of sulphur, costing $1,354,150; 280,057,041 pounds of tire fabrics, costing $126,522,448; 34,335,673 pounds of hose and belting duck, costing $12,503,375; 70,153,962 pounds of other cotton fabrics, costing $28,450,536; and other fabrics, costing $11,280,682.

In all the manufacturing censuses (1849-1935) at least the following data have been obtained: (1) number of establishments, (2) wage earners (average for the year), (3) wages, (4) cost of materials, containers for products, fuel, and purchased electric energy, (5) value of products, and (6) value added by manufacture. Beginning with the 1927 census, figures on reclaimed rubber (purchased and consumed and made and consumed) have been obtained and published; while figures on the horsepower of the industry were published from 1899 to 1929.

In addition to the Manufactures Division which, as we have seen, publishes the most complete separate statistics for the rubber industry, a number of other divisions within the Census Bureau publish statistics which, although not limited to the industry itself, are of great importance to the industry: (1) The Division of the Census of Business gives data on wholesale and retail trade as well as other related fields; (2) the Division of Cotton and Oils furnishes figures on cotton ginning 12 times during the ginning season; (3) the Division of Special Tabulations publishes, monthly, figures for clay products and sulphuric acid production; (4) the Division of Population supplies decennial population figures for each state, county, city, town, and village, and yearly estimates are made of state

(*Continued on page* 44)

New Rebound Resiliometer[1]

H. H. Bashore[2]

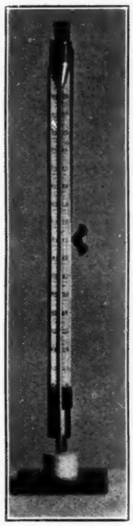
IN RECOGNITION of the value of resilience data, the need has been felt of an inexpensive portable and versatile instrument of simple construction and operation. The resiliometer illustrated was developed to meet these needs.

Description

The accompanying drawings illustrate the simplicity of construction. Part 2, the main support or backbone of the instrument is threaded at 24 and screwed into the base, 1. These two parts along with the wing nut, 6, comprise one unit.

The second unit is composed of a $\frac{1}{4}$-inch steel rod, 3, to which the part 4 is pinned at 5. Part 7 joins the two rods, 8 and 3, with adjustments being made by the set screws, 24. The scale, 15, 16 inches long, graduated into 100 equal parts, made of paper or metal, is superimposed upon part 4, of metal. The one-hundredth graduation is at the same height as the top of the cylinder, 10, prior to its release. Cylinder adjustments are made by set screw, 22.

Moving in unison with the second unit is a sub-unit or trip which releases the cylinder by pressing the bottom of part 19, toward part 4. Part 17, is pinned to 3 by pin 16. Acting as a fulcrum is a pin, 18, which passes through 17 and 19. Part 19 is slotted, thus furnishing two supports for the cylinder, 10, at its starting position. Part 4 is slotted at the top to allow passage for the two prongs, 21, of part 19.



The third unit is the cylinder, 10, which is allowed to descend upon the rubber specimen, 9, by releasing the trip 19. To secure the highest rebound and keep the instrument within practical dimensions the cylinder was made two inches long and one inch in diameter, weighing 150 grams and tapering to a wall thickness of $^1/_{32}$-inch at the point of impact, or as light as possible without resulting in a cutting action on the sample. The top is flat to facilitate the scale readings. To keep friction and vibration at a minimum the hole, 13, in the cylinder was made $^{17}/_{64}$-inch. The cylinder has a groove, 11, to fit the prongs of the trip.

Part 3 moves through part 2 in unison with part 4, which moves over part 2, thereby making the scale and resilience reading independent of variations in the size of the test specimen. Set screw, 6, maintains a uniform pressure after the cylinder is released and also prevents the second unit from descending with the cylinder during the impact. It also decreases vibration and holds the scale rod, etc., in proper position with respect to the sample. Spring 20, acting through trip 19, serves to hold the cylinder prior to its release and its descent upon the rubber specimen, 9. The top of the cylinder is beveled at 12 to actuate the trip. The cylinder is tapered as at 14. The rebound is, of course, observed above point 23. (The total height of the instrument is 17 inches.) Figures 3 and 4 are drawn to twice the scale of Figures 1 and 2.

The base of the instrument was made flat purposely to permit the testing of irregular sizes and shapes. However if it is desired to adopt a standard size for test specimens, a small removable apron with a hole large enough to take the standard-size sample can be made to fit the base.

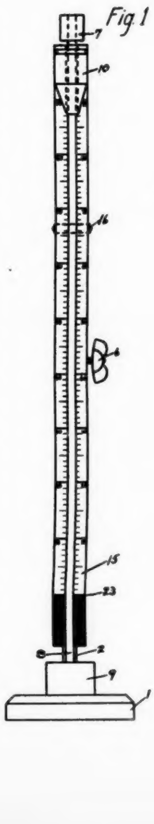


Fig. 1

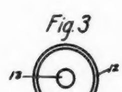


Fig. 3

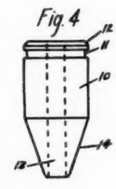


Fig. 4

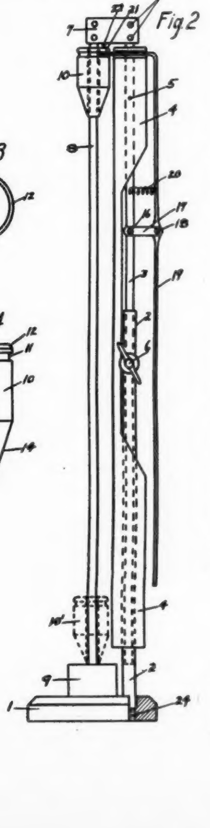


Fig. 2

Operation

The instrument should be placed directly on a solid level surface free of vibration. Even a desk blotter for a support would affect the readings.

After the cylinder is placed at the top of the rod, the wing bolt is released, the stem or scale lifted, and the center of the sample placed under the rod. The scale, rod, etc., which move as a unit, are then allowed to descend, and their combined weight allowed to rest on the sample through the rod. Three pounds' pressure is exerted by the weight of this top unit. This weight is sufficient to prevent vibration of the sample and hold it in place and not cause an appreciable depression where the weight rests on the sample through the rod. At the option of the operator the instrument can be adjusted so that no weight is allowed to rest on sample being tested.

The trip is then released, and the reading obtained by observing the scale immediately behind the top of the cylinder at the peak of the rebound. To secure additional readings the cylinder is replaced and again released. Since the first reading is usually low it is discarded. Readings are taken when the constant rebound is reached, which is usually the third or fourth rebound.

Thickness of Test Pieces

Up to a thickness of one inch the resilience reading increases with the increase in the thickness of the specimen. When a thickness of one

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[1] Patent applied for.
[2] Chemist, Whitehead Bros. Rubber Co., Trenton, N. J.

inch is reached, the curve flattens. Resilience of pure gum stock Q at 70° F. of various thicknesses follow:

¼"....64 ¾"......77 1¼"......79 1¾"......79
½"....74 1"......79 1½"......79 2"......79

A specimen thickness of one inch and diameter of 1½ inches seems the most convenient size conducive to accurate comparative readings. When comparing competitive samples, the specimens should be of equal thickness if the data is to be comparative.

Temperature

Experience with temperature is in agreement with the graphic results of C. E. Barnett and W. C. Mathews,[3] which show percentage resilience increase with corresponding temperature increases. Decreases in temperature result in decreased resilience. Hence results to be comparative should be conducted at 70° F.

Owing to the retarding effect of clay and carbon the accelerator in stocks J and O was increased to obtain the same curing rate of all samples.

		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q
Rubber	By Volume	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Whiting	" "	25	50	100	150	200											
Mineral rubber	" "						25	100									
Clay	" "								25	100							
Barytes	" "										25	100					
Carbon black	" "														25		
Thermax	" "												25	100			
Zinc oxide	" "															25	
Zinc oxide on 100/R	" Weight	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Sulphur	" "	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Accelerator	" "	.68	.68	.68	.68	.68	.68	.68	.68	1.4	.68	.68	.68	.68	1.4	.68	.68
Stearic acid	" "	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hardness (Shore Type A)																	
20' cure @ 40 #		50	59	75	60	80	30	33	50	80	52	75	50	90	70	56	35
30 "		52	60	77	65	80	32	35	50	80	52	76	50	90	80	56	38
40 "		52	61	78	80	80	35	36	51	85	52	80	50	90	83	56	40
50 "		52	61	78	80	82	36	37	52	85	52	81	50	90	85	56	40
60 "		52	61	78	80	85	35	40	52	85	52	82	50	90	85	56	40
Resilience																	
20' cure @ 40 #		67	62	45	38	26	60	30	64	13	69	38	60	28	36	66	72
30 "		68	63	46	39	28	67	35	65	14	71	39	68	30	38	67	78
40 "		67	62	45	38	29	69	38	64	12	72	39	70	32	36	68	79
50 "		66	60	44	37	27	67	37	63	11	68	38	63	33	33	64	78
60		65	59	43	36	25	67	36	62	10	66	37	66	29	30	63	76

Tests were made with specimens one inch thick by 1½ inches in diameter. The temperature was 70° F. All samples were allowed to rest 24 hours before testing.

Resilience at the optimum cure of a specimen one inch thick approximates data obtained with the Lupke resiliometer[4] using a test piece ¼-inch thick.

Shore Hardness vs. Resilience

From the above data it is obvious that there are four hardness, resilience relations: namely, high hardness-high resilience as typified by compound B; high hardness-low resilience as typified by compound J; low hardness-high resilience as typified by compound F and Q; low hardness-low resilience as typified by compound G.

It will be noted that the resiliometer measures differences in the state of cure, differences not detected by the durometer. Note particularly compounds M and N.

The durometer is in a great many cases not able to detect a poorly mixed batch of rubber since a specimen from the batch may be over-accelerated and underpigmented or under-accelerated and overpigmented and still show the same hardness; whereas the resiliometer does measure these shortcomings.

Relation of Resilience to Other Physical Properties

With the same pigment it is obvious that specific gravity, hardness, and modulus increase with the decrease in resilience. It is also obvious that with the same pigment resilience decreases with the tensile and elongation.

Results of tests on smoked sheets milled for various periods of time follow:

Time of Mastication Minutes	% Rebound	Plasticity*
0	78	92
15	62	73
20	61	72
25	60	71
30	59	70
40	57	69
50	55	68
60	53	67

*As measured by the Mooney plastometer.

Cold pressed samples 1½ inches in diameter by one inch thick were used in making the above tests on smoked sheets 24 hours after mastication.

Even though the sulphur and accelerator are master batched, plasticity or rebound tests of uncured stock would not seem to be reliable owing to the variation in plasticity of the rubber. This variation is capable of offsetting the variations due to pigment dispersion thereby rendering the results of seeming little value.

Tests on uncured rubber samples do not, therefore, seem to possess the merits of tests made on cured samples, since with the former, results of tests do not indicate the degree of dispersion of the vulcanizing, accelerating, and activating agents, a very vital shortcoming.

It would seem, therefore, that the range of usefulness of the plastometer and resiliometer in making tests on uncured rubber would be limited to the study of variations due to milling for various periods of time or in the study of master batch dispersion where the high loading minimizes the variations due to plasticity of the rubber.

Master Batches

Ordinarily the master batch, insofar as laboratory tests are concerned, does not secure the share of attention it deserves since it is not a balanced compound and does not contain all the ingredients necessary to secure the proper state of cure.

The degree of master batch dispersion can be detected by testing cold pressed unvulcanized samples of the standardized dimensions. Samples 1½ inches in diameter and one inch thick of the following master batches were tested with the accompanying results.

SS	55	33⅓	45	75
Carbon	40			
Thermax		66⅔		
Stearic acid	5			
Sulphur			50	
Accelerator				25
Dispersing agent			5	
Resilience	34	44	57	62
Hardness	No figures obtainable			

Sponge Rubber

By using an aluminum rebound cylinder instead of brass, thus decreasing the weight of the cylinder to 42 grams, resilience data may be obtained on sponge rubber

(*Continued on page* 51)

[3] *Ind. Eng. Chem.*, Dec., 1934, 1292.
[4] *The Vanderbilt News*, 4, 6, 25.

Aging Tests for Rubber Products[1]

Arthur W. Carpenter[2]

SOMETIMES accelerated aging procedures involving the application of other deteriorating influences are employed. These include tests in which the rubber is subjected to the action of ozone and those employing irradiation where the samples are exposed to light of various wave lengths. Such methods are particularly suitable for investigation of surface cracking of rubber which, as stated by Somerville, Ball and Cope,[3] does not occur during static aging in either the air oven or the oxygen bomb, although it is commonly observed with rubber under strain aged naturally and especially in sunlight. As yet there is very little standardization of either ozone or irradiation tests. The latter are coming into quite extensive use for laboratory control work because of the rapidity with which they yield comparative results at least qualitatively related to sunlight exposure, and because artificial light, which is always available, can now be produced with less variation than is encountered with sunlight throughout the year and in different localities. Ozone tests, however, are principally used at present in connection with research investigations.

In ozone testing it is absolutely necessary that the ozone supply shall be uniform in concentration and volume and that adequate control shall be provided of all essential factors including temperature and humidity. A suitable apparatus and method has been described by Kearsley[4] who made a thorough study of the effect of numerous variables in ozone testing. Similar equipment was employed by van Rossem and Talen[5] in their extensive investigation of surface cracking of rubber. Because of its extremely severe action on rubber, ozone must be very greatly diluted with air if good results are to be obtained. Kearsley found a dilution of 1 to 50,000, or 0.002% ozone by volume most satisfactory for comparative purposes when using an exposure period of 30 minutes. As ozone tests are used primarily to study cracking, the rubber samples are exposed while under some strain since this renders them more susceptible to attack and is necessary for cracking to occur according to Williams,[6] Haushalter, Jones, and Schade,[7] and others. The best elongation to use varies with different compounds, and a series of different strains is generally desirable unless that encountered in service is known, when it should be chosen.

Irradiation tests are even more difficult to standardize than ozone tests because light, though very effective in producing cracking and deterioration of rubber, seems to be of indirect rather than fundamental influence. Light is a strong catalyst of oxidation, as is well known, and doubtless its effect on rubber is closely associated with the presence of oxygen. Also, ultra-violet rays, which are especially active in causing surface cracking, give rise in the atmosphere to formation of ozone, and therefore irradiation tests are usually accompanied by ozone action. As to the light itself, Williams[6] found decided differences in the effects of radiations of different wave lengths, and Jecusco,[8] who studied this subject in considerable detail, concluded that apparently all rays must have some action at some stage of the degradation of vulcanized rubber. Before irradiation tests can be entirely depended upon, more knowledge is needed concerning both the effects of the various radiations and the means of producing them in controlled intensities and wave lengths. At present two types of lamps are in common use as light sources: mercury vapor quartz lamps giving large amounts of ultra-violet radiation, and carbon lamps producing light of which the spectrum is governed by the kind of carbons used. In the latter type the carbons usually chosen are those designed to duplicate as closely as possible the characteristics of summer sunlight. If the results with different lamps are to be compared at all, it is essential that the light from each shall show the same spectrum characteristics and shall strike the surface of the rubber with the same intensity. The samples must be accurately placed with respect to distance from the light source, and the temperature, humidity, and amount of air circulation must be carefully controlled. As with ozone, when testing for surface cracking by irradiation, the samples are exposed under strain. By careful observance of these precautions quite satisfactory results may be obtained.

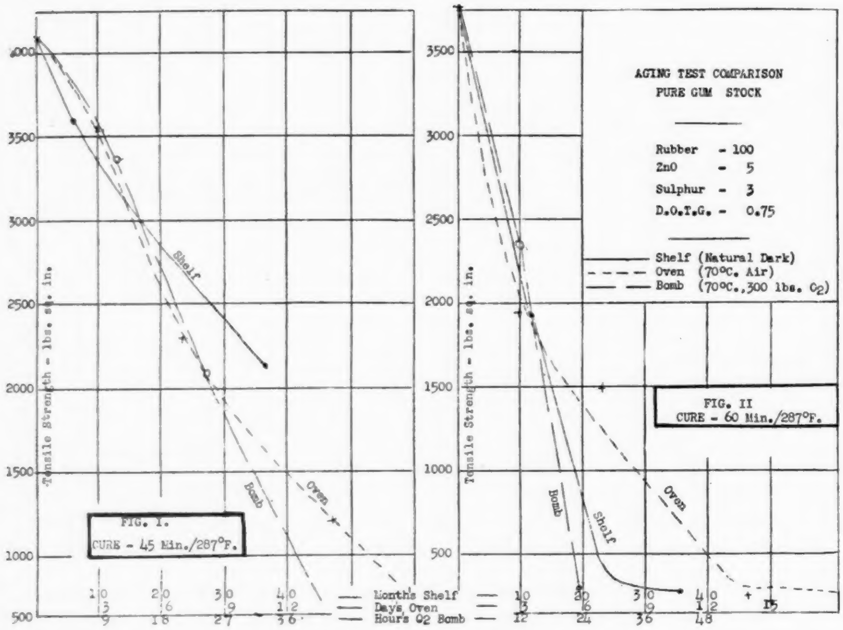
Selection of Test Method

When using any of these aging procedures for a particular rubber compound, the proper selection of both the type of test and the property to be used for measuring the deterioration depends on the conditions which the rubber must withstand in service. Since these are extremely varied, no single procedure will answer the requirements of all cases. In general that test should be applied which most nearly approaches the service conditions as judged by the physical characteristics and appearance of the aged sample. The Geer oven employing heat and oxidation has been found in many cases to produce in a period of days, deterioration in strength comparable to that occurring during years of natural shelf aging in the dark. However the test often fails to duplicate closely the appearance and hardening of naturally aged compounds, and, as would be expected, after several days at 70° C. the effect of heat is emphasized. The differences are especially noticeable with low grade and non-blooming compounds. In the oxygen bomb, on the other hand, oxidation is the predominating influence, and when this is the main factor in the degradation during service, the test is extremely useful. Because of the great acceleration alteration of the course of the deterioration sometimes gives difficulty, but in practice the short time necessary

[1] Paper read at meeting of Chicago Group, Rubber Division, A. C. S., No. 13, 1936. Published by permission of H. E. Howe, editor, *Industrial and Engineering Chemistry*. Concluded from INDIA RUBBER WORLD, Feb. 1, 1937, pp. 41-44.
[2] Manager, physical testing laboratories, B. F. Goodrich Co., Akron, O.
[3] Somerville, Ball, and Cope, *Ind. Eng. Chem.*, 21, 1183 (1929).
[4] Kearsley, *Rubber Age (N. Y.)*, 27, 649 (1930).
[5] van Rossem and Talen, *Kautschuk*, 7, 79, 115 (1931).
[6] Williams, *Ind. Eng. Chem.*, 18, 367 (1926).
[7] Haushalter, Jones, and Schade, *Ibid.*, 20, 300 (1928).
[8] Jecusco, *Ibid.*, 18, 420 (1926).

nearly every kind of test which may be suggested by the nature of the intended service, such as hardness, flexing, abrasion, tearing, and compression. It is not safe to assume that a particular aging procedure will affect the results of all these tests in similar ways or to the same degree. Considerable discretion is therefore required in making proper selections.

Correlation of aging tests with natural life has long been considered desirable, and many attempts have been made to determine, for example, how many months of normal aging are represented by each day in the Geer oven or each hour in the Bierer-Davis bomb. This problem was discussed in a symposium[10] on the subject presented before the New York Rubber Group of the American Chemical Society.

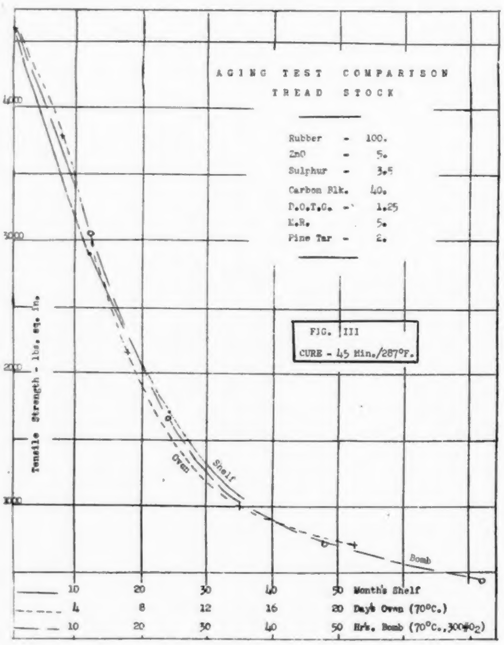


for bomb tests is a decided advantage. If the deterioration is not carried too far, it is usually possible, especially with compounded stocks, to secure results resembling quite closely those of natural aging except with respect to surface cracking.

The air bomb is primarily a heat test since the temperature is elevated to the vulcanizing range, and the samples so aged often do not resemble those obtained in natural aging. This is strictly a performance test and was designed only for those cases where the rubber actually operates in service under conditions approximating those of the test. Because of the extreme acceleration of deterioration in the air bomb as usually employed with high temperature accompanied by substantial air pressure, it seems doubtful whether this procedure should be regarded as a general aging test. There is excellent reason to suppose that the reactions occurring in it may be of quite different type from those in normal aging. In consequence adoption of it for purposes other than evaluation of heat deterioration in presence of air and attempts to interpret the results in terms of natural life should certainly be deferred until much more thorough investigation of the test has been made than as yet has been reported. The mere fact that extreme deterioration is produced in very short time is not sufficient reason for adoption of a particular procedure as an aging test. When a more rapid aging procedure is required, it would seem to be more rational to follow the reasoning of Ingmanson and Kemp[9] and to employ the carefully studied and well-tried oxygen bomb method, but with slightly higher temperature and lower pressure to give the increased rate. Generally, however, it is better practice to prolong an aging test somewhat rather than to make the conditions too severe.

Interpretation of Results

In all the accelerated tests it is usual to judge the extent of the deterioration by the change in tensile strength and ultimate elongation or in stress-strain properties. The specimens generally employed are therefore strips or dumbbells cut from standard test sheets. Within quite wide limits variations in the thickness of such specimens have very little effect on aging. At times other specimens are used, including even entire finished products, and the accelerated aging procedures are applied in conjunction with

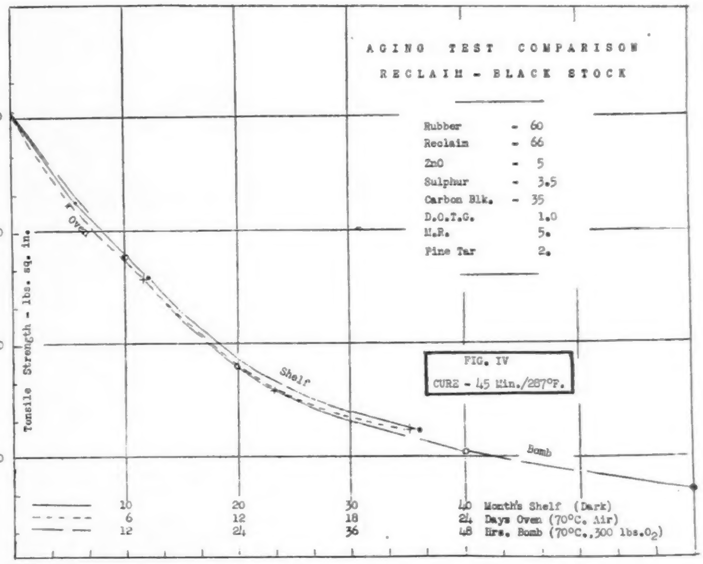


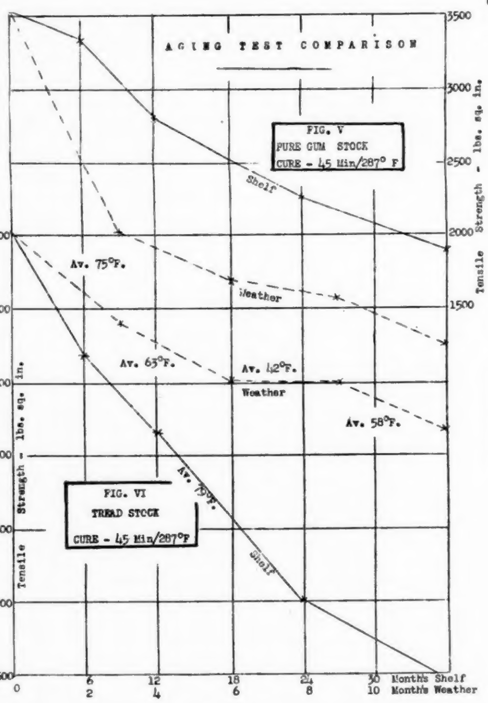
Geer and Evans[11] found approximate correspondence after several days in the oven of one-day test life to six months' normal aging in the dark. During the first day or so in test, however, improved physical properties are sometimes obtained rather than deterioration. This is especially true of undercured material and probably indicates that the state of cure advances under the elevated temperature faster than deterioration from oxidation develops. Williams and Neal[12] comment that it is well known that the physical properties of rubber will deteriorate in the oxygen bomb at 70° C. and 300 pounds per square inch pressure from three to four times as fast as the same rubber under the Geer oven conditions. Booth,[13] using tread stock, recently found approximate

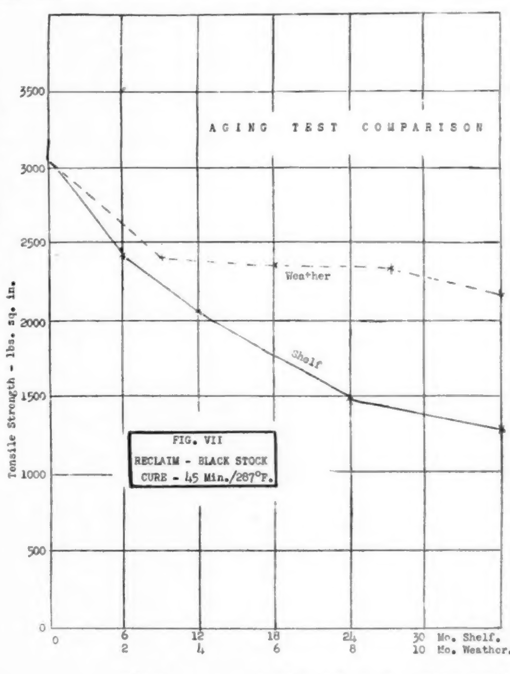
[9] Ingmanson and Kemp, *Ibid.*, 28, 889 (1936).
[10] Division of Rubber Chem., A. C. S., Symposium on Aging, *Ibid.*, 21, 1008 (1929).
[11] Geer and Evans, INDIA RUBBER WORLD, 64, 887 (1921).
[12] Williams and Neal, *Ind. Eng. Chem.*, 22, 874 (1930).
[13] Booth, Sept., 1936 meeting, Rubber Div. A.C.S., unpublished data.

correspondence of ten hours in the air bomb at 104.4° C. and 50 pound square inch air pressure with seven days in oxygen bomb and 21 days in the Geer oven. No correlation studies with natural life are available for the ozone or ultra-violet light methods. These are so highly accelerated that any correlation values would undoubtedly be subject to very large variation and error. Attempts have been made to relate oven and oxygen bomb aging with exposure to outdoor weathering conditions, but the latter is itself so variable that the results have been very erratic. Actually there is no general agreement as to a precise definition of normal aging, and usually the conditions during accelerated aging tests can be more closely regulated than those of natural life.[14]

In May, 1928, The American Society for Testing Materials, in its Committee D-11 on Rubber Products, undertook some correlation studies of three types of compounds:







namely, pure gum, carbon-black tread, and a carbon-black stock containing reclaimed rubber. These tests involved natural aging in the dark, weather exposure, Geer oven aging, and oxygen bomb aging. They extended for the dark aging over a period of three years. Duplicate tests were run by eleven cooperating laboratories, all presumably following a detailed standardized program. The test sheets of each compound were prepared from a single factory batch, mixed and cured by one company, so as to eliminate variations in the cured rubber specimens. Complete records were kept of the actual test conditions in all cases. A full report of this work which involved the aging of 450 test slabs and the testing of at least 1,800 dumbbell specimens would be too extensive to be given here. It must suffice to state that after thorough study of the data the committee found that the variations between laboratories caused by slight differences in technique were sufficient to prevent the securing of conclusive results, but the work indicated that there are no single correlation factors for each type of aging test which hold true for all compounds in various states of cure. To illustrate the reasons for this latter conclusion, some of the results which were obtained in the Goodrich laboratories are shown in Charts 1 to 4. The relations indicated follow:

Time Equivalent to One Year Natural Shelf Aging in Dark

Type of Compound	Minutes Cured at 141.6° F.	Days in Geer Oven at 70° C.	Hours in Oxygen Bomb 70° C. 300 Lb. Sq. In.	Quality of Correlation
Pure Gum	45	3.6	10.8	Poor
	60	3.6	14.4	Poor
Tread	45	4.8	12.0	Good
Reclaim	45	6.6	13.2	Good

It is of interest also to note in the averaged results from the cooperating laboratories in the A.S.T.M. study the marked differences between dark shelf aging and weather exposure. Some of these data as prepared by R. A. Schatzel,[15] then Chairman of Sub-Committee XV on Life Tests for Rubber Products, are shown in Charts 5, 6, and 7. The relative rate of deterioration in the weather for the pure gum stock is shown to be much more rapid as

(Continued on page 44)

[14] McKee and Depew, *Ind. Eng. Chem.*, 20, 484 (1928).
[15] Schatzel, Unpublished Report to Committee D-11, A. S. T. M., 1931.

The Properties of Rubber Cements

T. Foster Ford[1]

RUBBER cements used in factories manufacturing rubber goods consist of rubber-solvent dispersed systems. They usually contain, in addition to rubber, various pigments, softeners, curing agents, etc. The smoothness and thickness of the films deposited, the readiness with which the films break over small apertures in dipped objects, the viscosity and the stability of the cements as liquid systems are characteristics which affect their utility. The purpose of this paper is to present a summary of empirical data relating such working properties and important variables in composition. Whereas there is in the literature much data on the properties of extremely dilute rubber solutions, obtained in the course of theoretical researches, little information is available concerning the much more concentrated cements used commercially.

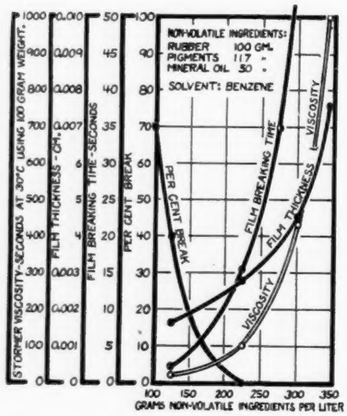


Fig. 1. Relation of Various Properties of a Rubber Cement to the Concentration of Non-Volatile Ingredients

Of the classical properties of liquids only viscosity will be discussed in this paper.

Viscosity

A rubber solution is not a truly viscous system. Newton's equation defining viscosity as the constant ratio of shearing stress to rate of shear fails to describe its flow characteristics, because in a rubber solution the ratio of shearing stress to rate of shear varies with the shearing stress.[2] Einstein's equation relating the apparent viscosity of a colloidal solution to the viscosity of the medium for the case of a dilute suspension of spherical particles also does not hold.[3] Numerous other equations have been proposed.[4]

Despite the fact, however, that viscosity measurements, in themselves, possess little fundamental significance, the term viscosity is widely used to describe in a general way the flow characteristics of cements. The property is suggestive of others of more direct utility, such as the thickness of film deposited upon a dipped article, but it does not take the place of actual measurement of these. In practical use viscosity is measured primarily to check uniformity. In experimental development it usually is of secondary importance. The manner in which apparent viscosity changes with concentration of solids for a commercial cement, as well as the relation of viscosity to other properties discussed in this paper, is shown by Figure 1.

Aside from concentration the degree of mastication of rubber is perhaps the most important factor in the control of viscosity, the viscosity of cements being enormously reduced merely by prolonged milling of the rubber compound. Viscosity also may be reduced by the addition of non-solvents, as ethyl alcohol, and by certain chemicals. Whitby and Jane[5] found the viscosity of dilute rubber solutions to be reduced by small amounts of acetic acid, monochloroacetic acid, dichloro-acetic acid, trichloro-acetic acid, diethylamine, piperidine, benzylamine, quinine, isobutylamine, etc., but not by aniline, and in this laboratory similar results were obtained with cements of commercial concentrations.[6] Different solvents may give solutions of widely different viscosities. For 1 to 2% solutions of fine Para an order of decreasing viscosity given by Gaunt[7] is benzene, chloroform, petrol; for Castilloa, chloroform, benzene, petrol. For factory-type cements of 10 to 30% concentration, in studying film breaking (assumed to be an approximate measure of viscosity), the writer[8] found the order: benzene, V M & P naphtha, ethylene dichloride; or V M & P naphtha, benzene, ethylene dichloride, depending upon the concentration. In general, for any given concentration of rubber compound, viscosity is reduced by increased pigment loading, due to less rubber and consequently less structure; but certain specific pigments, as carbon black,[9] or magnesia, cause increase in viscosity. Similarly, specific chemicals cause increase in viscosity, probably by a process of incipient gelling. Water increases the viscosity of cements when added in comparatively small amounts, but the presence of mere traces of water in rubber apparently reduces viscosity. Thus a sample of rubber dried for one year over sulphuric acid when made up to a 5% solution in xylene formed a gel; whereas an identical sample of rubber, but which had been kept for one year over water, when made up to a 5% solution in xylene gave a very limpid cement. The permanence of these various effects and the importance of relative amounts of chemicals have not been sufficiently studied.

Film Thickness

The thickness of the film deposited from a cement upon a dipped object is important not only because of effects upon adhesive or protective value, but indirectly because of its relation to the colloid mechanics of drying films to be discussed later under film smoothness.

A satisfactory measure of film thickness can be obtained by dipping a small iron panel into the cement to a

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[1] With The B. F. Goodrich Co., Akron, O.
[2] B. Dogadkin and D. Peuzner, *Kolloid Z.*, 53, 239-45 (1930).
[3] H. Staudinger, *Kautschuk*, 6, 153-58 (1930).
[4] W. F. Busse and W. B. Doggett, *Ind. Eng. Chem.*, (*Anal. Ed.*), 2, 314 (1930); R. Eisenschitz, *Z. physik. Chem.*, A158, 78 (1931).
[5] G. S. Whitby and R. S. Jane, "Colloid Symposium Monograph," Vol. II, p. 16 (1924).
[6] W. F. Busse and W. B. Doggett, Goodrich laboratory, unpublished results.
[7] R. Gaunt, *J. Soc. Chem. Ind.*, 33, 446-52.
[8] T. F. Ford, *Ind. Eng. Chem.*, 28, 915-18 (1936).
[9] C. M. Blow, *Trans. Inst. Rubber Ind.*, 5, 417-25 (1930).

definite depth and withdrawing carefully at a standard rate. When the solvents have all escaped from the deposited film, its weight and hence its average thickness can be determined by difference. With this simple test the experimenter may often obtain a better idea of the quality of a cement than with a viscosity measurement.

The film thickness deposited upon dipped panels increases with concentration (Figure 1), decreases with mastication, and changes with temperature and humidity for any given cement. A large number of qualitative observations by the writer indicate that, in general, solvents which evaporate quickly give thicker films than solvents which evaporate slowly. Non-solvents reduce film thickness, probably because they reduce viscosity.

Film Breaking

In dipping cements the ease with which the wet films break across small holes in perforated objects often is important. The film breaking tendency may be easily measured as "film breaking time," in seconds required for a standard vertical film to break, or as "per cent break," the number of films breaking of 100 standard films formed over small holes in a perforated panel.

The "standard film" used in experiments by the writer is that formed over a small round hole (0.63 cm. in diameter) centered 0.63 cm. from the end of a 5 by 12.5 by 0.079 cm. iron panel. Panels are dipped to a depth of 5 cm. in cements free from air bubbles or scum, withdrawn slowly at a standard rate, and time measured from the instant of withdrawal of the film through the cement surface. For the measurement of "per cent break" small aluminum panels 0.157 cm. thick carefully perforated with 100 holes 0.48 cm. in diameter, evenly spaced on 0.073 cm. centers are employed.

Film breaking probably is influenced by film strength (i.e., cohesive strength), surface tension, internal friction or viscosity, and evaporation rate. These effects are rapidly changing as the solvent escapes, and the mechanics involved are undoubtedly extremely complicated, but film breaking is the net result. Aside from its direct utility, film breaking, like viscosity and film thickness, is a measure of consistency, and this is illustrated by the similar manner in which these properties vary with concentration, as shown in Figure 1.

The film breaking tendency of a cement may be greatly increased by the addition of a non-solvent. In studying comparative effectiveness of various non-solvents in causing film breaking the writer has found the most satisfactory non-solvent for benzene cements to be isopropanol; for V M & P naphtha cements, isopropanol; and for ethylene dichloride cements, butanol.[8] While non-solvents improve film breaking, they decrease film thickness at the same time, and these effects must be compensated by simultaneous changes in concentration of solids and degree of mastication of rubber.

Film Smoothness

For many reasons it is desirable that deposited rubber films be smooth and that the pigments be distributed uniformly. One of the less obvious effects of poor pigment distribution is encountered in curing cements where the curing rate of the film may be greatly reduced because of agglomeration of sulphur particles. Agglomeration causes decrease in effective sulphur concentration, and for this reason more sulphur is ordinarily used in rubber compounds for cements than in corresponding compounds which are cured as batch stock without prior addition of solvent. Poor pigment dispersion may be the result of poor mixing of the rubber batch, and agglomeration of sulphur may occur through crystallization in solution, but redistribution of pigments always and inevitably occurs during the evaporation of the solvents from a film, because of vortex action.

Vortex action in color varnish has been described by Bartell and Van Loo.[10] A vortex is a tiny crater in which the solvent is boiling up in the center and flowing outward uniformly in all directions, and these vortices space themselves evenly, as hexagons, all over the surface of a film from which the solvents are escaping. The obvious effect of this violent motion in the fluid medium is transportation of particles; and under the microscope, in rubber cement films from which the solvent is evaporating, the pigment particles may easily be observed moving outward from and piling up around the vortices.

Ordinarily the particles of largest size, and at the same time least gravity, are those of sulphur; and these have the greatest tendency to pile up. If high boiling solvents, or heavy petroleum oils such as Nujol, are present in the film, "secondary flow" is made possible, and here again it is sulphur that has the least tendency to flow back into the film and redistribute itself. The size of the vortices depends upon film thickness, particle size, and solvent, because these influence fluidity. If solvent mixtures are well chosen and fine particle size pigments used, the effect of vortex action can be greatly reduced.

Cement Stability

One of the nuisance properties of cements is gelling. Some cements gel and some do not. Some gel quickly, and some require months. Gelling may occur for a number of reasons, and not all gelled cements look alike. Whether these differences are due to differences in kind of gelling or merely to differences in degree is not known. The words gelling, livering, curing, and lobbering have been used rather loosely to indicate the physical condition of cements which have "set up." Even the physical differences implied by these words are not clear; the chemical differences, if any exist, are not understood. In terms of structure, however, the mechanism of gel formation is probably one of interlocking of contiguous rubber fibers or molecules through some kind of chemical bond.

Spontaneous gelling of cements, at room temperatures, may be caused by ultra-accelerators. It may also be caused by increase in effective accelerator or sulphur concentration as a result of reduction of pigment loading in the rubber compound.

Many chemicals that are not vulcanizing agents cause gelling. These cases may be explained by polymerization of rubber, activation of accelerator already present in the cement, or by specific effects on the swelling power of the solvent. Similarly, certain chemicals prevent gelling in some cases. An important example of the effect of chemicals on cement stability is afforded by the case of the chlorinated solvents.

Chlorinated solvents sometimes cause gelling and sometimes prevent it, and these effects may be due to traces of chlorine or hydrogen chloride formed by decomposition of the solvent. In many cases the changes in the cement evidently are caused by chemical action of chlorine or hydrogen chloride on the accelerator present. Thus chlorinated solvents often cause gelling of cements accelerated with certain aldehyde-amine reaction products, and it is known that chlorination of certain members of this class of accelerators greatly increases their activity.[11] As an example of an opposite effect, Thiollet[12] found that gelling of cements accelerated with tetramethyl thiuram disulphide or with a mixture of tetramethyl thiuram monosulphide and mercaptobenzothiazole was prevented by replacing

[10] F. E. Bartell and M. Van Loo, *Ind. Eng. Chem.*, 17, 925-29 and 1051-1056 (1925).
[11] S. M. Cadwell, U. S. patent No. 1,852,444, Apr. 5, 1932.
[12] R. Thiollett, *Rev. gén, caoutchouc*, 9, 79, 5 (1932).

benzene or gasoline with ethylene dichloride, but that the ability of the film to cure was destroyed at the same time. In addition to this point, however, Thiollet observed that after a few days the apparent viscosity of the ethylene dichloride cements began to decrease in contrast with the corresponding benzene and gasoline cements. Obviously the chlorinated solvent, probably through its decomposition products, has a profound effect not only upon the accelerator, but upon the rubber as well.

Non-solvents, such as isopropanol, in certain cements induce gelling. This effect seems due to increase in effective total solids concentration of the cement by solution of a portion of the solvent in the non-solvent. The granular appearance of gelled benzene-isopropanol cements supports this explanation in that an incipiently discontinuous system is indicated.

Oxygen may either reduce viscosity, or apparently, cause gelling. These contradictory effects are possibly explainable on the basis of amounts of oxygen present. Traces seem to cause gelling and may be assumed to promote a "sulphurless" type of contiguous chain linkage, or vulcanization, through free valences. The fact that antioxidants do not prevent gelling seems to lend support to this view.[13] Appreciable amounts of oxygen, on the other hand, perhaps by decreasing the length of the rubber molecules,[14] reduce the gelling tendency.

In curing cements the use of pigments may promote gelling because of incipient vulcanization promoted by the higher temperature of milling. When this effect is not produced, large volumes of pigments may, on the other hand, inhibit gelling both by increasing breakdown of the rubber and by their dilution effect.

Reduction of concentration of the rubber compound in a cement always tends to prevent gelling. This, of course, is an effect resulting from further expansion of the gel structure. In very thick cements, however, this effect of expansion may be offset by the solvent functioning as a vehicle for the sulphur and the accelerator. By facilitating contact between rubber and curing agents a small amount of solvent may cause a system to cure more quickly than if no solvent were present.[15]

Other Properties

Drying time is directly controlled by evaporation rate through choice of solvents, indirectly, by temperature and humidity.

Pigment settling is reduced by using pigments of fine particle size, by improving pigment dispersion, by powerful solvents such as kerosene, and by protective colloids as triethanolamine soaps. Settling is promoted by non-solvents such as isopropanol.

The brushing, spreading, and spraying qualities of cements are improved by increased mastication, by using high boiling solvents, and by incorporation of proper amounts of resins and pigments.

[13] R. A. Crawford, Goodrich laboratory, unpublished results.
[14] W. F. Busse, *Ind. Eng. Chem.*, 24, 140 (1932).
[15] A Bourbon, *Rev. gén. caoutchouc*, 8, 81, 9-13 (1932).

Census Facts

(*Continued from page* 36)

populations.

The Division of the Census of Business has collected data covering wholesale and retail trade and other businesses, not considered as manufactures, for 1929 and 1933 and is at present completing a census for 1935. These business censuses give the number of establishments, net sales, total expenses, average number of employes and their wages, and the stock of merchandise on hand at the end of the year. All these items are reported for the various kinds of businesses, as tires and tubes, sporting goods, industrial chemicals, etc. It will pay the manufacturer as well as the marketer to become familiar with the Census of Business Volumes.

Many interesting and important facts can be obtained from an analysis of the census figures. For instance, wage-earner employment in the rubber industries reached its peak, 158,549 in 1919; while the value of products manufactured was greatest, $1,261,000,000, in 1925. The maximum number of tires, 74,000,000, were reported in 1929, and it is thought that if the total quantities of rubber products could be reduced to a common unit, this total would also be found to have reached its maximum in 1929. These figures tend to show the technical developments in the industry, displacing man-labor with machines.

The 1925 high value of products was largely due to the high price of rubber, which in turn can be attributed to the operation of the British Stevenson Plan which restricted the exports and thereby the production of rubber of British Malaya and of Ceylon. The plan, enacted November 1, 1922, was essentially a plan of raising prices by limiting production. The New York spot price reached a high of $1.048 in November, 1925. After 1925 rubber production increased despite this plan and on November 1, 1928, the entire restriction scheme was abandoned.

Study of the census reports will enable a manufacturer to determine whether his own business has been increasing as rapidly as the industry as a whole; whether the "spread" between his outlay for salaries, wages, materials, etc., and the value of his products is larger or smaller than the average of his industry. Statistics covering industries in which his products are consumed assist him in locating and measuring his industrial market. A study of the wholesale and retail censuses of business for 1929, 1933, and 1935 (when released) along with manufactures distribution of sales reports, will assist the manufacturer in determining his distribution channels and measuring their efficiency and, after once setting up his distribution system, to follow any changes in marketing trends which might affect the distribution of his products.

The reader may immediately obtain, free of charge, the 1935 preliminary release for rubber products and the 1933 Volumes of Manufactures and Business by writing to the Census Bureau in Washington. The 1935 Census of Business Volumes may be obtained as they are released by writing to Fred A. Gosnell, Census of Business, 2401 Chestnut St., Philadelphia, Pa. Final Volumes II and III of Retail Trade and the preliminary Wholesale Trade Report are now available. The final volume of the 1935 Census of Manufactures will be released later this year.

Facts at your finger tips are indeed a necessity to modern management whether in the field of research, manufacturing, or distribution.

Aging Tests

(*Continued from page* 41)

compared with natural aging in the dark than in the case of the compounds containing carbon black. This would appear to indicate a protective action of the pigment in screening the rubber from the accelerating effect of light. Since the weather exposures were started in May and the test lasted an entire year, these curves show the influence of seasonal variation in temperature and amount and quality of sunlight. It is evident that weather deterioration is much more rapid under summer conditions than at other times of the year. For the rubber samples given,

(*Concluded on page* 48)

Rubber Quotas and Exports

R. H. Wright

THE writer of this article has had 15 years' experience as a rubber planter in Malaya and has made a detailed study of estate and native holdings. His article "Rubber: the Coming Boom," printed in our November, 1936, issue[1] was reprinted by Symington & Wilson of London, England, in its weekly report, November 25, 1936. At that time Symington & Wilson made inquiry among producers and as a result made a statement that the general opinion seemed to be that estates will find themselves unable to produce more than about 80% of their assessment, but the question of how much the Dutch natives can produce still remains rather in the air.

The following article was written in early December, 1936, and presents the instructive British viewpoint, at that time, of Mr. Wright, who has given the subject considerable thought.

THE rubber industry is now in a distinctly interesting, if not intriguing, position. Stocks, both domestic and world, are falling with almost monotonous regularity; at the moment of writing those in Great Britain stand at 80,315 tons against 163,636 a year ago, while world stocks have fallen from 645,488 to 465,613 tons during the same period. Naturally this steady reduction in stocks has been reflected in the price of the commodity: it has touched 10d. a pound within the last day or two as compared with 6⅓d. at the end of December, 1935. He would be a bold man who would be prepared to wager on the price of rubber at the end of 1937.

Supply and Demand

As in every other industry, the selling price of the commodity is governed by the laws of supply and demand. For years the rubber industry has suffered from the handicap of overproduction, with its logical corollary, mounting stocks—those stocks which have hung round its neck and came perilously near to strangling it. But now, with demand increasing every day and new uses for rubber being found in almost every phase of industry, a problem presents itself—to those who take the long view at least—the answer to which is wrapped up in another question: Can the estates (or producing countries, rather) obtain the full amounts of their awarded quotas?

At first glance this is a question which may savor of the absurd—to the average shareholder, ignorant of planting conditions, at least. Has not the International Rubber Regulation Committee, a committee of experts, if ever there was one, gone into the matter with the most painstaking thoroughness, he is prone to argue. Is it likely that such a body would make the mistake of over-assessing the productive capacity of the planting industry? At first glance his contentions may appear reasonable enough; to his brothers of the large family of average shareholders they may even seem unanswerable. Were the average shareholder a practical planter of executive experience, however, he would almost certainly modify his opinions. To the experienced planter who has studied the matter closely in the light of his specialized knowledge, my question is a very real one. *He* believes that the productive capacity of the states *as a whole* has been over-estimated. At the same time he is aware, of course, that certain estates could produce appreciably higher crops than the committee has credited them with; through various causes they have been unable to furnish the necessary figures to substantiate their claims to higher quotas. Such estates have been unfortunate, but the committee cannot be blamed for their failure to secure a higher Certificate of Standard Production. In any case they are really the exceptions that prove the rule; taking the producing countries as a whole, there is little doubt that they have been over-assessed considerably.

To the planter this is understandable. The International Rubber Regulation Committee had a colossal task to face in securing unanimity of agreement, for there is little doubt that each producing country presented the very best case for liberality in quota allowance in its power. The wonder is that the committee did as well as it has done, for it is to be remembered that it succeeded in producing a scheme shorn of the obstacles that brought the old Stevenson restriction plan to the ground: it brought practically the whole rubber-producing countries into one united line while at the same time providing for the much-needed elasticity of release lacking in the Stevenson scheme. At the same time it is not quite fair to condemn the Stevenson scheme out of hand. It was not the fault of the promoters that the Dutch failed to come in, leaving British Malaya and Ceylon to "carry the baby;" had Netherland India thrown in its lot with the British growers and more elasticity been given in the matter of exportable percentages of standard production, there was little to prevent it functioning smoothly. True, it was a grievous mistake raising the pivotal price. In the first place such an increase was not necessary; in the second it savored very much of a "squeeze," and as such it was hailed, and rightly so, in the United States, by far the largest consumer of the commodity. The Stevenson scheme, however, is a thing of the past, but one must not forget that the machinery it set up for the purpose of assessing production was used to great advantage by the present international committee. Much thought and hard work went to the setting up of that machinery, as the writer, who acted for the Assessment Committee in the matter of the valuation of native holdings, inspections following appeals against the awards of the committee, etc., has good reason to know. Reduced to hard facts, even the most bitter critic of the Stevenson scheme must admit that its chief fault was that it did its work too well. Anyway it provided an object-lesson for the present committee; through its very shortcomings the new committee was able to avoid certain pitfalls which otherwise might have loomed large in its path.

[1] "Rubber: the Coming Boom," p. 41.

Possible Capacity

There is little doubt that the year 1937 will be an eventful one for the rubber industry. Present indications all point to the estates being permitted some time during the next twelve months to produce to capacity. Already the I. R. R. C. has felt impelled to grant a much higher percentage release as from January 1 than the market would have dreamed of a few months ago: 75% of quota for the quarter January-March, and 80% for the following three months; otherwise a jump of 10% for the first quarter followed by a further 5% on April 1, with the proviso that these figures are subject to revision. There is food for thought in these figures. With world stocks falling as they are, and manufacturers replenishing their depleted working stocks, not to mention the greatly increased world trade which gives every promise of expanding still further, the time cannot be far distant when the estates will be on 100% production.

But to the planter that 100% stands for—well, just a figure written on a piece of paper. Boldly stated, he does not believe that the estates can produce it. As to the actual amount they *can* produce, planting opinion is divided, but the margin of difference is small; some hold that 75% of quota is their limit; others talk of 80% to 85%, in certain cases even 90%. Speaking generally, the expected shortage appears about 20%. In other words, the main body of planting opinion holds that to obtain the committee's award of 80% as from April 1 next the estates will be forced to tap to full capacity. It is to be remembered that the planter's opinion is not one to be treated lightly; by virtue of the position he occupies and the specialized knowledge he possesses his words should, at least, be weighed carefully. After all, the opinion of the man on the spot, more particularly when he happens to be an expert on the subject, is usually worth listening to. And most definitely his opinion is that the estates cannot produce that 100%. Nay more, from my own personal knowledge coupled with certain advices from the Far East, just a possibility exists that the full 75% awarded by the committee for the first quarter of 1937 may be found difficult to obtain, despite the fact that January is the "peak" month of production on the majority of estates in Malaya. It is true that the "wintering" period, when the trees shed their leaves and crop falls heavily, begins as a rule in February and lasts until the end of April, but with every acre in tapping and taking into account the heavy crop for January, the decrease in crop should not amount to more than 25%. What, then, of those estates which owing to the incidence of restriction have large areas, amounting in many cases to one-third their total acreages, closed down? Why not reopen those areas and obtain all the extra crop required?

Low Production Areas

The answer to that question would disclose one of the main reasons why a large number of estates cannot hope to produce that 100% of their quotas. On such properties, more particularly in the case of the older estates, many of the steep hillsides and summits simply would not pay to tap under restriction as their yields would not pay wages. Naturally, then, the manager closes down such unprofitable areas and concentrates on the more productive parts of his estate. By so doing he achieves three main objects very dear to him: he obtains his crop from the trees best able to yield it, brings down costs of production to the minimum, and "rests" the uneconomical areas in the hope that eventually such areas will become more productive.

This matter of the depreciation of the trees on the older planted estates is a much more serious one than the average shareholder is aware of. In the old days of the industry when prices were high and more or less haphazard methods were the order of the day, whole areas of trees received injuries from which they have never really recovered. Overtapping with consequent heavy bark consumption and much "wounding" was the chief cause, but in addition there was the denuding of the steeper hillsides of valuable top soil. The obvious remedy is replanting. But the replanted trees have to grow to the producing stage before they come under the tapper's knife, in, say, six years; and in the meantime the remainder of the old trees are growing no younger. As to the actual non-productive hilltops, hundreds of such hilltops are in Malaya, carrying in the aggregate hundreds of thousands of rubber trees which can only be classified, in the language of the planter, as "duds."

The reader may have noticed in press reports of company meetings that certain estates claim to be in a position to obtain their full exportable rights under the restriction scheme, with areas varying from one-quarter to one-third of their mature tappable acreages closed down, the inference being that if they were to tap "all out" they could produce crops far in excess of their awarded quotas. Too much attention need not be paid to such statements. The rubber tree benefits by such so-called "resting" if carried out under a systematic periodic cycle. Take as an example an estate of 3,000 acres in full bearing. Divide it into three equal portions of 1,000 acres, and rest one portion four months in the year while tapping the other two, taking the portions in rotation, otherwise the "A.B.C." system. Suppose the estate were on an 80% restricted crop; it might surprise the reader to learn that under this system the manager would have every hope of obtaining this 80%—with one-third of the estate shut down. This system is not a product of restriction; it was in use years ago.

Prospects for 1937

In the November issue of INDIA RUBBER WORLD I pointed out the serious situation bound to arise when producing countries reached the maximum of production with no new plantings coming into bearing for a number of years. But events have moved rapidly since I wrote that article. Now who can say what the future holds for the industry? As I have already said, the indications are that the estates will be permitted to produce to capacity some time during 1937. But when that time comes, what is going to happen if they fail to obtain their quotas? Even if the deficit should amount to only 10%, the price of the commodity will jump instantly. There is nothing to prevent it, for the world must have rubber. One cannot help wondering, with the passing of the months, not so much how many extra thousands of tons will be required to keep pace with the increasing world demand, but the price manufacturers will be forced to pay for it.

UNITED STATES RUBBER CONSUMPTION IN 1936 REACHED an all-time high at 573,500 long tons, 16.7% higher than the previous high of 491,500 tons in 1935, and 21.5% greater than the next highest, 472,000 tons in 1929. Actual statistics for rubber consumption by all nations in 1936 are not available, but the estimate is over 1,000,000 long tons. The next largest single rubber consumer is the United Kingdom, with probably 95,000 tons for 1936. Others are Germany, 70,000 long tons; Japan, 58,000; France, 56,000; Russia, 32,000; Canada, 30,000. Practically every country of the world is now a consumer of crude rubber; while the rubber manufacturing industry 20 years ago was confined almost entirely to the United States, Canada, and western Europe.

Evolution of Rubber Mills

THE art of rubber plasticizing and compound absorption involved an early change by eliminating the aid of solvents, but otherwise advancements have been confined mainly to improvements in equipment from the standpoint of efficiency, scope, and safety. Early rubber working methods consisted of converting the gum to a thick spreadable dough or cement by soaking and grinding it in "camphene" or refined turpentine, using a pug-mill type of mill similar to that employed for kneading clay in brick making.

A distinct advance in rubber milling was made in the neighborhood of 1825 by the introduction of a crude machine consisting of a pair of heavy wooden rollers set in a timber frame. The same solvent for softening the gum was still used to facilitate the grinding action of the rolls. Iron rolls were very soon substituted for those of wood, and it promptly became evident that the heat of milling softened the dry gum, but did not make it so sticky as did the solvent. That observation ended disagreeable grinding with a solvent and its dangerous fire hazard.

Non-Solvent Plasticizing

In 1844 Henry Goodyear introduced the process of heating the rolls with steam, thereby making it possible to obtain faster and more thorough mixing of powders with the soft masticated dry rubber. The original steam-heated roll grinders were belt driven. A heavy timber frame stood by the side of the mill and supported a fast-and-loose pulley for the power drive. The pulley shaft was provided with a large gear that ran in a pinion, set near the floor. This pinion shaft extended across the rear of the grinder and at its extreme end held a second pinion meshing with a large gear that turned the front roll of the grinder. A similar shaft ran under the front of the grinder and by its connection with the driving gear of the front roll turned the back roll by a pinion gear. Thus the power was conveyed entirely around the grinder before being applied to drive it.

This "boomerang" pattern of mill drive in various modifications continued in service for many years. Such grinders were slow running machines mixing batches of 12 and 14 pounds amid a clattering of gears and shrieking of belts.

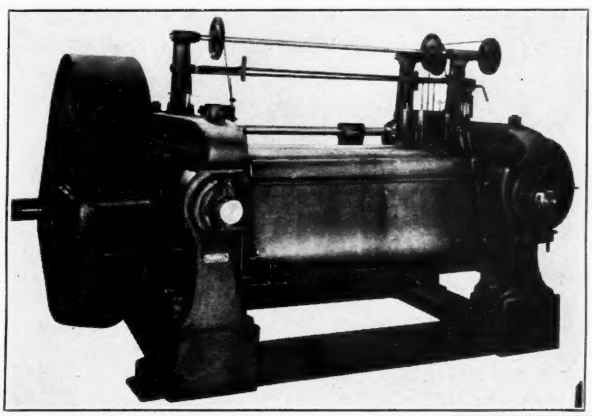
Direct Geared Rolls of Greater Capacity

The necessity of greater production gradually forced rubber manufacturers to improve their mixing machinery. In this work they had assistance from machinery builders who originated and built well-designed mills and calenders. They promptly discarded the belted power arrangement and in its place installed a floor shaft in which was located a pinion meshing into a large gear mounted on the end of one mill roll; while gears on the farther ends of both rolls made one roll turn the other. The machines were enlarged; the castings made heavier, the rolls larger, and the speed was increased. As a result, larger batches were handled with each successive increase in the size of the rolls.

Methods of Manipulation

The operator was equipped with a short-blade hand-knife to cut the batch so as to effect uniform milling. He also used a shovel and bench brush to recover the compounding ingredients which fell into the shallow box that spanned the space between the mill frames beneath the rolls. The stray material thus gathered was returned to the batch by the mill man until all was absorbed in the completed mix.

This crude method was eliminated by the introduction in 1891 of the automatic mixing apron invented by Edward F. Bragg while in the employ of the Boston Woven Co., now the Boston Woven Hose & Rubber Co., East Cambridge, Mass. Briefly described, this device is a short endless belt of duck and rubber extending the full width of the compound box. The upper surface runs from rear to front under the rolls and is drawn against the face of the front mill roll and brought up even with the top of the machine where it is held by strong springs. The belt is driven by friction resulting from pressure against the revolving mill rolls, thus delivering the unabsorbed powders back to the bite of the rolls for remixing. When the powders are completely absorbed, the belt is dropped down into the compound pan out of the way and thorough working of the stock is continued as if the belt were not there. A much improved form of mill apron is now in operation for certain types of stocks.

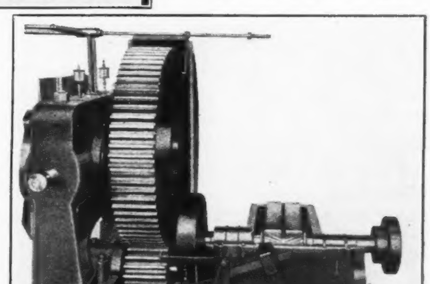


Farrel-Birmingham Co., Inc

Mixing Apron on 26-Inch by 84-Inch Mill

Early Mill Engineering

The former National Iron Works, W. E. Kelly, Proprietor, New Brunswick, N. J., was an important builder of mills and other heavy rubber machinery. Unfortunately most of this company's records and all of

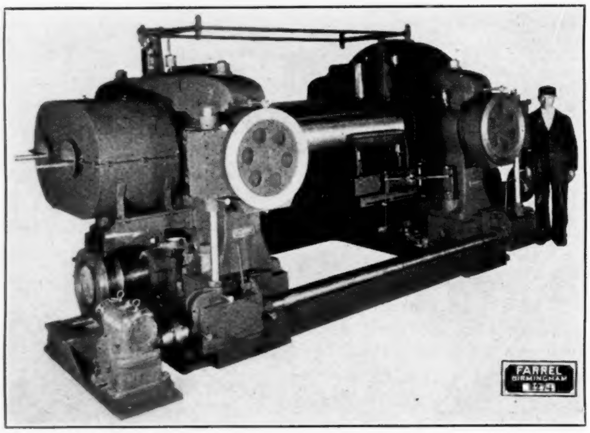


Wm. R. Thropp & Sons Co.

Type R. N. Drive Assembly Showing Gears, Bearings, and Oil Rings

its drawings have been destroyed. The same is true of the early drawings of the Birmingham Iron Foundry of Derby, Conn. These two concerns and the Farrel Foundry & Machine Co., Ansonia, Conn., were for many years the principal designers and builders of heavy rubber mill equipment, such as washers, mixers, refiners, and calenders. Ultimately their facilities were united as Farrel-Birmingham Co., Inc.

C. F. Schnuck, division engineer, contributes the following references to early rubber mill development by the Farrel company:



Farrel-Birmingham Co., Inc.

24-Inch by 84-Inch Sheeting Mill with Motor Operated Roll Adjustments and Strip Cutter

"Order Book No. 2 records an order for a 2-roll rubber mill received in January, 1869. Owing to the methods of manufacture at that time a pattern was of greater importance than a drawing and it was not until early 1882 that drawings were preserved and tracings made.

"The first mills were small in size with 12-inch, 14-inch, and a few 16-inch diameter rolls, with 40-inch face. The first large-size mill was 60-inch face, having rolls 22-inch diameter, built in 1890. In 1897 was constructed the first 84-inch mill, having rolls 22-inch and 26-inch diameter respectively. This was called a 'Jumbo' mill, after the well-known elephant.

"The first attempt was made in 1897 to equip mills with roller bearings, but they did not prove successful and after a reasonable trial were replaced by sleeve bearings. Attempts have been made periodically to equip mill rolls with anti-friction bearings, and although they can now be made to withstand the loads and operating conditions, they do not seem to make any great saving in power.

"The Farrel company also made the Turner guides in 1897. These were not the automatic guides as understood today, but consisted of a central guide in the middle of the face of the mill to divide the batch into two parts. This idea was not greatly favored. In recent years, however, it has been found occasionally useful for two-stage warming on a single mill.

"The first roll scraper of which we have record was applied in 1894. It was a hand-operated traveling scraper for removal of sticky stock, but ordinary bladed scrapers were used on refiners previous to this and also on linoleum machinery.

"The first application of ring oiling to the journal boxes of rubber mills was in 1903, and combined with water cooling of boxes in 1904. Ring oiling has been supplanted by other methods of lubrication, but water cooling still remains.

"The first application of motor drive for rubber mills was made in 1899, and at that time the first magnetic clutch was built for connection between the drive and the line shaft.

Safety Features

"For many years rubber mills were disconnected from the line shaft by means of jaw clutches thrown in by a lever. The first application of safety devices for the operator was in connection with these jaw clutches in 1892 and consisted of a pawl which would drop in and engage with a flange on the clutch. Coil friction clutches, introduced in 1906, were applied directly to the neck of the roll and also to the driving end of a line shaft. In 1907 the Farrel company applied four clutches to drive the mill lines at the G. M. R. Shoe Co., Naugatuck, Conn. This was the first electric release as a safety device. These clutches, while mechanically operated, had a solenoid in the control system which was connected with switches at the various mills, and the interruption of the current at any mill would release a clutch and stop the line, thereby allowing any operator along a line to protect a fellow worker who might be caught. As far as can be determined from record, in 1914 the first application was made of dynamic braking for safety stopping of calenders which had direct current motors."

On present-day mills the safety device consists of an electric switch activated by a system of levers and bars conveniently placed over the rolls and acting vertically up or down from either side of the mill at a height adjustable to suit the operator. The switch is wired to the under voltage release on the control so that when the levers are operated through this switch, they will throw the current off the motor and at the same time operate a rod that trips the hand-reset brake for stopping the momentum. On this brake is a separate switch wired to the control; so the motor cannot be started with the brake on.

Flexibility of Modern Design

Rubber mixing mills of today range from the laboratory size with rolls 6 by 13 inches handling small test batches up to mills having rolls 28 by 84 inches set on a square drop bedplate for line shaft drive, for individual motor drive or in small units of two or three mills driven by one motor. A sheeting mill can be built with motor operated roll adjustment and individual right-angle motor drive. Such mills can also be designed for the drive shaft above or below the floor, in the rear or under the mills, and fitted with cast tooth or cut gears, solid or split pinion, and stuffing boxes or open discharge funnels for the water which cools the rolls. In fact today milling units can be and actually are being built to suit the individual requirements of the particular installation.

Aging Tests

(*Concluded from page* 44)

the changes in rates of deterioration appear to be consistent with known variations in average temperature and characteristics of light.

While artificial aging tests do not make possible the reliable prediction of the probable life of rubber in service under all circumstances, they are of great value when used comparatively in connection with compound development and in the control of manufacturing. The best tests are those which most closely approach the conditions of actual service. Too great acceleration of the rate of deterioration should be avoided, and newly proposed conditions for aging should not be relied upon until thorough investigation has proved that the same types of reactions are involved in the test as in the service being evaluated.

Lactron Thread and Lastex Yarn[1]

R. G. James, Ph.D., B.Sc., A.I.C., A.I.R.I. (Sc.)

LASTEX yarn is the registered trade mark of a wide range of elastic yarns prepared by spirally wrapping one or more of the known textile fibers around a central core of Lactron thread. Cut thread covered in the above manner has been on the market for a long time, but the covered rubber cords made in this manner have always been of relatively coarse and heavy construction and consequent limited application chiefly owing to the hesitation of manufacturers to make and use fine-gage cut rubber thread. This hesitation amounted to definite refusal in most cases, the trouble being the relatively rapid deterioration and aging of cut rubber thread in fine counts.

The advent of latex thread, however, opened up new possibilities as this material could be relatively easily extruded in fine gages and had a natural resistance to deterioration which was sufficient in itself to make ultra-fine gage thread a commercial proposition. The credit for visualizing and developing covered elastic thread in such fine gages that it could definitely be classified among the usual textile yarns must undoubtedly go to America, and in that country the new Lastex yarn, as it was called, had a very enthusiastic reception.[2]

It must be remembered, however, that the speciality of Lastex yarn is the Lactron thread core, as the textile yarns used for covering the core, though of the highest quality and specially selected, are nevertheless the normal products of the textile industry.

That Lastex can, in addition, be included in the size range of the yarns commonly employed in the garment and allied trades and can therefore be classified as a textile yarn, is shown in the following table, where typical Lastex yarn constructions are shown in comparison with the approximate limits of textile yarn sizes used in weaving and knitting.

Comparison of the Size Range and Extensions of Typical Lastex Yarn Constructions with Those of Other Textile Yarns

Yarn	Type	Approx. Diam.	% Stretch
Cotton	10's count	0.012 in.	6%-7%
	200's count	0.0026 in.	
Worsted	10's count	0.015 in.	
	100's count	0.0045 in.	10%-20%
Silk	50 denier	0.0035 in.	
	22 denier	0.0023 in.	Approx. 18%
Rayon	250 denier	0.0077 in.	
	50 denier	0.0035 in.	7%-25%
Lastex	C	0.037 in.	150%
	W	0.0185 in.	175%
	09	0.014 in.	125%
	ST	0.010	100%
	504	0.007 in.	105%

In the above table it should be noted that the stretch shown for the ordinary textile yarns is that of their ultimate extension and that their recovery from this extension is, unlike Lastex yarn, extremely poor. Wool or worsted is the nearest approach to an elastic yarn among the normal textile fibers. For those not familiar with the system of size notation used for textile fibers it may be added that this is determined on a length-to-weight basis and not on cross-sectional width as in the case of rubber thread.

Thus for cotton, the count is given by $\dfrac{\text{yds. per lb.}}{840}$,

for worsted $\dfrac{\text{yds. per lb.}}{560}$

and for silk and rayon the denier is given by $\dfrac{\text{weight in grams of 476 meters}}{0.0532}$

For Lastex yarn itself there is no relative system of counting, as owing to the large number of variables which would have to be included, such a system would be unnecessarily complicated. Instead each type of yarn is identified by a construction number, such as those shown in the above table. These construction numbers specify for each particular yarn the count and color of the Lactron core, the nature, count, number of ends, and percentage of the covering yarns, the ultimate elongation to which the Lastex yarn can be extended, and its finished gage and yardage per pound.

Method of Covering. In the covering process the Lactron core in a stretched condition is spirally wrapped with a first layer of textile fiber, and over this a second layer is similarly wound in the opposite direction. The spirals of textile fiber are wound with an open pitch so that when the covered yarn is relaxed, the spirals can draw together to form a close-pitch helix of larger diameter, which will allow the core to contract in length and expand in diameter, until it is again gripped by the covering. The core therefore has two extensions at which it is gripped and held by the covering, one slightly higher than that at which it was originally covered, and one much lower at which it remains in the Lastex yarn when the latter has fully contracted after leaving the machine. It is thus seen that in any piece of Lastex yarn the Lactron core is in a stretched condition, which generally amounts to less than 100%. This means that with a Lastex yarn of 150% maximum elongation, the Lactron core is at an elongation of rather less than 400% in the fully stretched yarn. As the elongation at break of Lactron thread is of the order of 800 to 900%, it is obvious that in such a construction the core is working well within its capacity.

In order that the covered yarn shall lie flat with no tendency to twist up or snarl when relaxed, it is essential for the torque caused by the one wrapping to be neutralized or balanced by that imparted by the second or reversed wrapping. To achieve this it is generally necessary for the inner covering to be wound on to the core at a faster rate than the outer covering, the speed ratio being approximately of the order of 3 to 2.

As regards the machine itself, the Lactron thread, wound on a bobbin, is placed on a carrier in the base of the machine and is drawn up through two hollow spindles situated vertically one above the other by means of a pair of driven take-up rollers above the upper spindle. The relation between the surface speed of the take-up rollers and the speed of unwinding of the Lactron thread from

[1] Reprinted from *Trans. Inst. Rubber Ind.*, 1936, 2, 104-18. Continued from India Rubber World, Feb. 1, 1937, pp. 45-47.
[2] E.P. 380,368, 1931; E.P. 370,761, 1930.

the bobbin determines the stretch at which the core is covered. Mounted on the spindles are packages of covering yarn, which are rotated by the spindles. These spindles, of course, rotate in opposite directions and at each revolution put one coil or wrap of covering yarn round the core.[3] To prevent irregular ballooning of the covering yarn in its passage from the package to the Lactron core it is necessary to provide some means of control which may take the form of a wire loop or flyer, attached to the top of the spindles above the packages and free to rotate thereon. Owing to the drawing-off of the covering yarn by the moving core the flyers actually rotate faster than the spindles. The core passes through the take-up rollers in the covered condition and the issuing Lastex yarn is wound up on collecting drums. From the drums the yarn is removed in skein or hank form, and is passed to the examination stands (see Figure 1). After examination the yarn is either packed in hank form or wound on to cones before despatch.

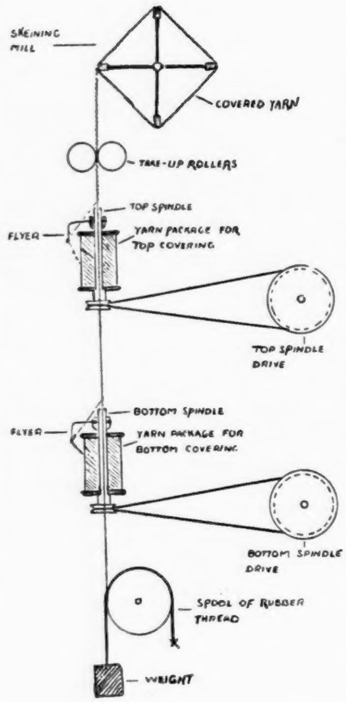


Fig. 1. Diagram of Standard Rubber Covering Machine

Preparation of Various Types or Constructions of Lastex Yarn. To obtain any one type of construction of covered yarn it is necessary to adjust to predetermined values a number of possible variables on the covering machine. The nature and effect of these variables may be briefly summarized. Starting with any particular gage of Lactron thread or core, and wrapping round this core a single thread of a certain count of cotton in one direction and over this a second wrapping of similar cotton in the other direction, it is possible with this simple basic arrangement to obtain the following variations. *A*. The extent of stretch of the Lactron core when the cotton wrappings are applied can be varied. Low-core stretch will tend to give a covered yarn of a soft and lazy movement and of low ultimate elongation. High-core stretch tends to produce a covered yarn of long elongation with a strong recovery. The core stretch variation is, of course, obtained by adjusting the speed of winding up of the covered thread in relation to the speed of unwinding of the Lactron thread from the bobbin. *B*. The number of coils of cotton wrapped round each inch of stretched Lactron thread can be varied. To do this it is necessary either to alter the rate of upward movement of the Lactron thread through the spindles bearing the covering cotton or to alter the revolutions per minute of the spindles without changing the rate of core movement. High wraps per inch of cotton covering will hold the core at stretch and restrict the recovery of the covered yarn when relaxed. In this manner a short elongation covered yarn will result, but if reasonable core stretch is used, the yarn will be quite lively. Low wraps per inch, on the other hand, give a long elongation covered yarn which may have a lazy reaction. *C*. The cotton wrappings can be applied tightly or loosely to the Lactron thread core by adjusting the tension of the cotton at the time of wrapping. Loose wrappings present less restriction to the core and consequently tend to produce covered yarn of long elongation, large finished gage, and low yards per pound. Tight covering tends to give the reverse effect.

[3] E.P. 402,652, 1933.

It must be remembered, however, that items *A*, *B*. and *C* take place simultaneously, and the ultimate effect depends on the combination of all three. Thus with a high-core stretch, tight wrappings, and large number of wraps per inch, the covered yarn will have a low finished gage, short elongation, and a high yardage per pound. By loosening the wrapping and reducing the coils per inch, the contraction after covering will be greater, and a covered yarn of longer elongation, increased gage, and reduced yards per pound will result. With the above three machine variables go a diversity of what may be called raw material changes. Thus: *D*. The gage of Lactron thread used can be varied. *E*. Various counts of cotton can be used, and a different size can be used on each spindle. *F*. The number of threads, or ends, of cotton on any single spindle can be altered. It is usual to have multiple ends of cotton on at least one spindle. *G*. The material used for covering the Lactron thread may be any of the known textile fibers, for example, cotton, silk, wool, rayon, linen. *H*. The material used for covering may be of natural color or may be bleached, or dyed, or in the case of cotton may be mercerized. *I*. The color of the Lactron thread used may be cream, pink, blue-white, or black.

Whatever the particular arrangement chosen for the construction, the actual yarn produced must have the core and coverings working in unison with each other, as indicated, for instance, by the core and both coverings breaking simultaneously when the Lastex yarn is stretched beyond its elastic limit.

The vast number of individual constructions possible by a full use of the above variables is disconcerting from a manufacturing point of view, but generally speaking trade requirements tend to fall into a reasonable number of fairly well defined groups. Table 1 gives particulars of a number of typical Lastex yarn constructions.

Table 1

Some Typical Lastex Yarn Constructions

Lastex Yarn Constr. Ref.	Count of Lactron Thread Used	Inner Covering	Outer Covering	Ultimate Elong. of Covered Yarn	Gage of Covered Yarn	Yards per Lb.
504	125's.	2 ends 14 denier silk.	2 ends 14 denier silk.	105%	0.007 in.	18,000
503	125's.	2 ends 200's count cotton.	2 ends 200's count cotton.	105%	0.008 in.	11,000
2015	100's.	2 ends 100's count cotton.	2 ends 100's count cotton.	140%	0.013 in.	5,500
MA	100's.	3 ends 50's count cotton.	1 end 50's count cotton.	55%	0.016 in.	4,500
526	75's.	1 end 36's count cotton.	1 end 50's count cotton.	225%	0.020 in.	3,000
Z	50's.	2 ends 100's count cotton.	3 ends 100's count cotton.	150%	0.020 in.	2,800
K	37's.	2 ends 50's count cotton.	2 ends 100's count cotton.	125%	0.024 in.	2,000
C	30's.	1 end 24's count cotton.	3 ends 24's count cotton.	150%	0.037 in.	900

Properties of Lastex Yarn. An indication of the gage range of Lastex yarns has already been given. With regard to the ultimate elongation of the finished yarn, this can be controlled within fairly narrow limits from about

60 to 300% or over, the possibility of variation increasing slightly with the higher elongations. As regards color range, a number of popular shades are produced at the time of manufacture by the use of dyed covering yarns, but many special shades are obtained subsequently to manufacture by dyeing the finished yarn. Certain precautions must be taken when dyeing Lastex yarn, such as the strict avoidance of copper, manganese, and chromium contamination, but the problem of dyeing as well as bleaching has for all practical purposes been solved.

The question of appearance and finish has already been answered, as this is a matter of the type of covering yarn employed, and these can be cotton, or mercerized cotton, silk, and so forth, or mixtures of these as required.

On the subject of durability, there is the accumulated evidence of several years of marketing in Europe and a still longer time in America. This evidence, as well as that of test reports from such institutions as the Good Housekeeping Institute, British Launderers' Association, and National Federation of Dyers and Cleaners, shows that the durability of Lastex yarn is sufficient to enable it to survive the normal life of garments in which it is properly incorporated, including the normal dry cleaning, laundering, dyeing, and wear to which such garments may be subjected.[4]

USES OF LASTEX YARN. Rubber thread has an ultimate elongation of somewhere around 900% and finds extensive use in the uncovered state as warp thread in webs for braces, belts, and suspenders. These webs, however, often have ultimate elongations of between 50 and 150% and therefore require a fair amount of inextensible warp and weft threads in order to control the greater extensibility of the rubber. To cheapen such webs, therefore, covered rubber of appropriate stretch, which obviously needs much less control, is often used.

Other early applications of covered rubber were found in the manufacture of corsets, elastic panels, and surgical garments. In all these early applications the covered rubber was used either in the warp, in woven or warp-knitted material, or was laid-in in weft knitted fabrics. The term laid-in applies to threads inserted as an addition to an already complete fabric and can therefore be drawn out without breaking up the fabric structure.

For all these purposes there are appropriate Lastex yarn constructions, but in addition there are certain further applications which the fine gage Lastex yarn has made possible.

Fine gage Lastex yarn can be used as weft thread in woven material, permitting the easy production of light, but strong weft-way stretchable fabrics.

Material containing Lastex yarn in both warp and weft can be made. Such fabrics, being extensible both warp-way and weft-way, find special application in corsetry in the manufacture of garments which, by flexing in every direction with body movement, give added comfort and insure perfect smoothness of line.

Fine gage Lastex yarns can replace ordinary yarn in the normal knitting process and so enter into the actual structure of knitted fabrics. In this manner garments such as stockings and socks with integral knitted garters, and light-weight surgical stockings and bandages can be made.

The weaving of such fine gage elastic yarns into light dress, trimming, and drapery materials permits striking ornamental effects such as ruching and frilling, which were not possible with coarse gage covered rubber.

It can now be seen why a variety of Lastex yarn constructions of different gage and ultimate elongations are necessary. Fairly coarse gage long extension yarn is necessary for laying into roll-on corsets; while fine gage long extension yarn is used for ruching light dress material. Fairly fine gage medium extension yarn is used for knitted surgical stockings; while short elongation yarn of various gages is used in woven corset and suiting cloth.

Summarized, therefore, the chief uses of Lastex yarn fall into the following categories: (i) to support garments in position during wear, e.g., knitted as an integral garter into hose or woven into webs for the tops of pants; (ii) to obviate temporary or permanent set in garments, e.g., as knitted in bands at the wrists, waist, or neck of knitted wear, knitted into bathing costumes or woven into suiting cloth; (iii) to give body support or correction, e.g., as woven or knitted corsets, surgical stockings and bandages; (iv) to enable close-fitting garments to retain position and fit during body movements, e.g., as two-way stretch material used in foundation garments; (v) to relieve strain on delicate material during body movements, e.g., knitted into silk stockings above the knee to give vertical stretch and so prevent "laddering" due to knee flexing; and (vi) to produce novel effects in dress and furnishing fabrics, e.g., ruched or frilled effects.

In conclusion, the author wishes to express his thanks to Lastex Yarn & Lactron Thread, Ltd., for permission to present this paper, and to his colleague S. F. Smith for assistance with the demonstration apparatus.

[4] *Textile Weekly*, Mar. 22, 1935, p. 331.

New Rebound Resiliometer

(*Continued from page* 38)

with a range of approximately 20 to 80%, or about the same range that is possible with the non-porous compounds using the metal cylinder with a weight of 150 grams. There seems to be a more definite relation between hardness and resilience of sponge rubber than there is between hardness and resilience of non-porous compounds. With sponge the resilience decreases with the hardness.

Tire Testing

By removing the base, 1, and support, 2, and modifying the support for the rest of the instrument, tests can be conducted on tires placed on the usual anvil and with no alteration of the instrument. The simplest method is to extend rod 3 about eight inches and invert the 1-2 element which serves the same purpose in either position. The base, 1, should, of course, be bolted to a solid support in this inverted position. Tests are then conducted as described in paragraphs 1, 2, 3 under operation.

Miscellaneous

In case the sample to be tested is too large to place on the base, the latter may be placed directly on the article, the top section turned 180 degrees and cylinder allowed to descend directly on the sample.

Although plasticity tests on uncured stock evaluate the working properties of stock in factory processing and the Shore hardness tests help in defining pigment loading and evaluating a property differing from resilience, neither test seems to possess the merits of resilience tests for factory control of stock mixing. Neither will the combined result of both hardness and plasticity tests bring to light the shortcomings in pigment, accelerator, sulphur, and activator dispersion.

Since resilience is a property differing vastly from hardness, etc., the additional data enable the rubber compounder to duplicate competitive rubber goods with greater precision and dispatch. This test offers a link in the long chain of data necessary if all the physical properties of a rubber compound are to be evaluated.

Editorials

Business Outlook

THE general business perspective appears to indicate a continuation during 1937 of the increasing volume of consumption and, necessarily, of production to keep pace with the requirements. In a number of industries, the time seems far off when production will reach a point where shipments can be anticipated and a suitable inventory of finished goods can be maintained.

With very few exceptions, the producing and merchandising activities of the country are healthy and give promise of a fairly steady growth. At the moment the demand seems just ahead of the supply, with a good volume assured for several months either through contracted purchases or reasonably definite indications that the consuming agency is likewise on an increasing basis.

The present scarcity is caused by a series of events. Owing to the lesser volume of business transacted during the early part of 1936, inventories of finished goods which at that time appeared adequate were insufficient to take care of the unusual demand which occurred during the latter part of 1936. During past years many plants had been dismantled as the result of consolidation in order to reduce costs; consequently ample capacity in factory space, equipment, raw materials, or recently trained labor was not available immediately to take the load which was suddenly thrown on producers. In most cases a few months were necessary definitely to indicate a sustained demand. By this time surplus stocks had been reduced to almost nothing, which fact resulted in a concerted drive to expand facilities for increased production. Thus at the beginning of 1937 a great many companies had excess orders on their books with little or no elasticity in inventory to enable them to gain on the incoming orders. A necessarily gradual process of expanding capacity will undoubtedly require several months before producers will be in a position to settle down to a production equalized with actual consumption.

Specifically as related to the rubber manufacturing industry, practically all suppliers are very busy and expect a continued demand for their products. Machine and equipment manufacturers are doing a very excellent business and have an unusual number of unfilled orders. Crude rubber stocks are comparatively low, and while the restriction on shipments has practically been removed for the first nine months of 1937, there is grave apprehension as to the producers' ability amply to meet the demand. Reclaim orders are greater than capacity because in addition to an increased normal outlet, rubber manufacturers are attempting to replace present high priced rubber. Secretary of Agriculture Wallace recently urged cotton growers to raise a maximum crop in 1937, but as stocks are low, a shortage is possible before harvesting time. Producers of compounding ingredients are also very busy, but with the exception of zinc products there is good probability of an ample supply.

A heroic effort is being made by suppliers to maintain prices at the present level even in view of increasing demands. Their success in the future will be influenced by the cost of labor rather than raw materials. Present favorable business conditions in the rubber and allied industries will undoubtedly continue unless extended strikes cripple industries which consume rubber products or unless the demands of labor force such high cost of production as to prohibit volume purchases by the public.

Crude Rubber Supply

FUTURE activities as to relative supply and demand and probable prices cannot be very definitely prognosticated, but present indications are that unless a stampede is started, the situation can be controlled even though it was out of hand during the past few months. The uncertainty of the future is influenced by the lack of definite information regarding two major activities; namely, the amount of rubber that can be produced and the quantity being bought for future protection by consumers or by governments in preparation for war possibilities.

Of the world consumption, normally the United States uses over 50% which in December, 1936, and January, 1937, was only slightly higher than in January, 1936. Thus actual consumption through normal channels cannot be responsible for shortage or high prices. Opinion indicates that the estates cannot rapidly increase production, but that Netherland India has an indefinite capacity which may take care of the situation.

On February 15, Premier Colijn of Holland made the statement that his guess was that prices would not be maintained at present levels. It is reported that London dealers are disturbed at the not-interested attitude of American consumers and their reluctance to pay higher prices. Quite possibly a conservative attitude by the United States may enable the situation to right itself within a short time.

S. C. Stillwagon

EDITOR

What the Rubber Chemists Are Doing

A.C.S. Activities

Akron Group

APPROXIMATELY 250 technical men attended the meeting of the Akron Group, Rubber Division, A. C. S., on January 15 at the Akron City Club, Akron, O. V. L. Smithers introduced H. T. Youngren, chief engineer, Oldsmobile Division of General Motors Corp., as the speaker of the evening. In a long, but interesting address he told his listeners what it means from an engineer's standpoint to bring out a new model of a car. Each of the essential parts was discussed.

Boston Group

THE Boston Group, Rubber Division, A. C. S., held a very enthusiastic meeting February 12 at the Kenmore Hotel, Boston, Mass., with an attendance of 106 members and guests. After a very enjoyable dinner the meeting was called to order by Chairman Royce J. Noble.

H. E. Grier, from Massachusetts Institute of Technology, gave a most instructive explanation and demonstration of the Stroboscope, which was developed and invented by Professor Edgerton, of M. I. T., and which utilizes the principle that a flashing light synchronized with an object in motion tends to make the object appear as at rest. Mr. Grier showed two reels of moving pictures that demonstrated the possibilities of using the Stroboscope for research and development of machines and processes. It is possible to photograph the flight of a bullet traveling 900 feet per second. Pictures can be taken at the rate of 6,000 per second.

Motion pictures portrayed clearly the detailed movements of such actions as: water flowing from a faucet; air passing from a revolving fan with the resulting vortexes; a cup of milk dropping on to a wooden board with the bounce of the cup and the splash of the milk at various stages; flying birds, such as a pigeon, wren and humming bird whose wings beat at the rate of 50 per second; a house fly beating at 200 times per second; a soap bubble bursting (pictures taken at 1,200 per second); a snake's tongue in action; a cat turning over while being dropped only 14 inches; popcorn popping; coffee percolating; drops of milk falling into a thin film of milk demonstrating the effects of surface tension; a spinning frame running at 10,000 r.p.m. (pictures taken at 4,000 per second with an exposure of 1/200 second); a tapping machine at 3,600 strokes per minute; a shaper cutting stainless steel and cast iron; the quiver of human muscles in the arm and leg when in action; and a golf club striking the ball with pictures taken at the rate of 960 per second (the club velocity before impact was 166 feet per second; and after impact 122 feet per second; the golf ball had a velocity of 197 feet per second, and the spin of the ball was 5,200 r.p.m.).

After seeing these pictures, it is easy to visualize the practical application to which the Stroboscope can be put.

Everett G. Holt, assistant chief, Leather and Rubber Division, Bureau of Foreign and Domestic Commerce, Washington, D. C., gave a detailed discussion of rubber values and the price of rubber, in which the following salient points were brought out: Average prices of prime ribbed smoked sheets in New York were 11.9¢ in 1930, 6.1¢ in 1931, 3.4¢ in 1932, 5.9¢ in 1933, 12.9¢ in 1934, 12.3¢ in 1935, 16.4¢ in 1936 and around 21¢ so far in 1937. The average declared value for all grades of crude rubber imported into the United States, which is nearer the price obtained by producers, was 12.91¢ in 1930; 6.57¢ in 1931, 3.51¢ in 1932, 4.89¢ in 1933, 9.80¢ in 1934, 11.40¢ in 1935, and 14.55¢ in 1936, according to official import statistics. It must, of course, be considered that the gold value of the currency varied, but prices received by producers during this period are sufficiently indicated by these facts.

Although suffering hardships experienced by all agricultural industries during this period, the plantations industry lived and eventually effected economies and increased yields so that in 1935, with rubber at 12.3¢ in New York and the average import value at 11.4¢, British companies on the average actually paid 3½ and 4% dividends. Also in 1935 permissible exports averaged only 67.5% of basic quotas, much lower than at present. On this basis in 1936 British company dividends should be at least 10% although permissible exports averaged only 62.5% of basic quotas. With higher permissible exports (now allowable in 1937) profits should be higher even if 1936 prices prevailed. It seems reasonable to conclude, therefore, that a price range of 14¢ to 17¢ appears to be as high as is reasonably justifiable and that a steady price above 20¢ would appear to provide very high profits for efficient plantations, almost none of which failed to earn profits at 12¢, unless taxation were increased very greatly.

Los Angeles Group

THE Los Angeles Group, Rubber Division, A. C. S., held its monthly meeting February 2 at the Hotel Mayfair, Los Angeles, Calif. The 90 members and guests present enjoyed a variety program consisting of a very complete discussion of Neoprene by James H. Norton, of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., followed by some talking movies on "The Wonder World of Chemistry" produced by the du Pont company. P. K. Holland, manager of the Zellerback Paper Co., gave a humorous talk on "Personality in Paper," which tended to give one a better appreciation of the comforts of modern-day life. Ed. Nahm, of Naugatuck Chemical, also made a few appropriate remarks, and Bert Dougherty brought the gathering up-to-date with gossip about the group members.

An additional attraction was a fine Texas Centennial dinner plate for everyone present, donated by du Pont. E. W. Sharpe, of Kirkhill Rubber Co., won a Magic Maid Food Mixer presented by Mr. Nahm, and Sam Tanney, of H. Muehlstein & Co., Inc., drew the cocktail shaker donated by Mr. Dougherty. Bill Voit, of the W. J. Voit Co., contributed three rubber balls of various dimensions, and winners were Frank Baglin, of West American Rubber (baby ball), Gordon Boelter, of Goodyear (medium ball), and A. B. McMurray, of National Standard (extra large).

Chicago Group

THE Chicago Group, Rubber Division, A. C. S., held a meeting February 26 in "Ye Old Town Room" of the Sherman Hotel, Chicago, Ill., including dinner. J. Kirschner, chief chemist of the Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, arranged the evening's events and acted as chairman. The scheduled program included an address on "Business Management through Three Typical Stages of Development with Coordinated Functioning of Interdepartmental Relationships," by U. L. Harmon, vice president of Dryden Rubber and formerly assistant manager of the mechanical goods division,

Firestone Tire & Rubber Co., Akron, O.

O. J. Urech, chief chemist of Sam'l Bingham's Son Mfg. Co., Chicago, has arranged the program for March 26, which will be held at the Sherman Hotel. Dinner will be served in the College Inn. Reservations should be sent to Ben W. Lewis, secretary, Chicago Rubber Group, 365 E. Illinois St., Chicago.

Dr. A. A. Somerville, vice president, R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y., will be the speaker of the evening on the subject, "More Pictures Than Talk."

New York Group

THE New York Group, Rubber Division, A. C. S., will hold its next meeting Friday evening, April 2, at the Building Trades Employers Association clubrooms, 2 Park Ave., New York, N. Y. An interesting program is promised by Chairman J. Miscall, although no details have been released as yet.

Spring Meeting

THE next meeting of the American Chemical Society will be held in Chapel Hill, N. C., the week of April 12. Registration will be at the University Library. The Rubber Division plans to hold its sessions on April 14 and 15. The place of meeting at Chapel Hill has not yet been decided upon.

Ample accommodations are being provided for registrants in University dormitories, fraternity houses, and private homes. No hotel rooms will be available at Chapel Hill at the time of the convention. It has been suggested that those planning to spend only one night at the convention use Durham hotels rather than campus accommodations. Such reservations should be made directly with the Washington-Duke Hotel, Durham, N. C.

Symposium

Seventh National Organic Chemistry Symposium, Division of Organic Chemistry, will be held by the A. C. S. at Richmond, Va., December 28 to 30, 1937.

Rhode Island Rubber Club

THE spring meeting of the Rhode Island Rubber Club will be held at the Narragansett Hotel, March 12. Dr. A. A. Somerville, of R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y., will present "More Pictures Than Talk." Edward J. Kelly, superintendent of the Rhode Island State Police, will introduce two of his experts: Dr. Wallace Bohrer, who will discuss "Scientific Detection of Crime;" and Sergeant James E. Norman, who will demonstrate the methods, apparatus, and materials used in detecting crime and proving guilt.

Artificial Enzymes as Vulcanizing Accelerators[1]

IN TRYING to synthesize certain enzymes, German chemists found that organic compounds of relatively simple chemical composition possess catalytic properties. For example, isatin is a typical dehydration catalyst. It absorbs hydrogen from aminoacids and gives it off to the air producing water. Similar action is exercised by lactoflavin, but only in the presence of colloidal carriers. Other reactions carried out with the aid of simple organic catalysts are the decomposition of pyroracemic acid into aldehyde and carbon dioxide which is a side-reaction in the alcoholic fermentation, and the catalytic saponification of organic esters to acid and alcohol.

From such simple organic catalysts highly active compounds may be developed which resemble enzymes in many respects. The method of activating them consists in introducing certain atom groups into the molecule of the catalyst. In doing this, a number of substances are produced differing by the position of the activating group of atoms in the molecule. When all the isomera possible are obtained, it is easy to determine which possesses the strongest catalytic action. By these methods a number of compounds have been developed which bear a similar relation to natural enzymes as the coal tar dyes bear to natural coloring matter of plants; they are chemically different, but produce the same effects.

Synthetic enzymes are not only equal to natural, but are more stable. The principal application of these artificial compounds is in vulcanization of rubber where they represent an important group of accelerators. Most of them exert their action by entering with sulphur into chemical compounds which are more reactive than sulphur alone. Whereas in the earlier period of vulcanization of rubber higher temperatures and longer treatment were necessary because of the relative chemical inertness of sulphur, the use of the new accelerators saves time and fuel and incidentally preserves the susceptible molecular texture of rubber.

[1] Excerpt from German Chemical Notes, Oct. 3, 1936, submitted by Consular Clerk, W. S. Jesien, Frankfort-on-Main. Released by Dept. of Commerce, Bureau of Foreign & Domestic Commerce, Washington, D. C.

Effect of Vulcanization on X-Ray Diagram of Gutta Percha[1]

C. S. Fuller

THE finding of previous investigators that gutta percha and balata have identical X-ray patterns is verified. Experiments on the X-ray behavior of vulcanized and unvulcanized gutta percha show that vulcanization (to the extent carried out here) has no effect in changing the lattice plane spacings of either the alpha or beta crystal modifications. Vulcanization does appear to increase the degree of orientation of the crystallites present in these substances as produced by stretching and to that extent allows a more accurate calculation of the identity periods of the crystalline forms to be made.

A partial transformation of the beta to the alpha form of gutta percha results by stretching at 80° C., although the exact conditions under which this occurs have not been determined.

The identity period in the fiber direction of the beta modification is 4.77 ± 0.03Å., or double this value, and the alpha modification presents an anomaly in that two identity periods are in best agreement with the data. These are 9.00 ± 0.05 and 8.70 ± 0.13 Å. In the case of the beta modification three possible orthorhombic unit cells in agreement with the observed lattice plane spacings are given.

[1] Presented before the Division of Rubber Chemistry at the ninety-first meeting of the A. C. S., Kansas City, Mo. Abstracted from *Ind. Eng. Chem.*, Aug., 1936, pp. 907-912.

Acetylene in Rubber

PAUL WALTER recently discussed[1] the method and advantages of applying both acetylene gas direct and calcium carbide in the production of rubber goods which won for him the annual award of the Syndicat International de Calcium. He showed that rubber treated with acetylene or compounded with calcium carbide has better aging qualities than untreated rubber. Calcium carbide together with a crystallized salt having many molecules of water (to liberate the acetylene) can advantageously be used to inflate rubber balls, balloons, and similar articles instead of sodium nitrite and hydrochlorate of ammonia. With or without a salt and a saponifiable oil, it can replace bicarbonate of soda or carbonate

(Continued on page 70)

[1] *Caoutchouc & gutta-percha*, Dec. 15, 1936, pp. 17746-48; Jan. 15, 1937, pp. 3-5.

New Machines and Appliances

Incline Plane Tester

THIS model (I-P-3) of incline plane tester is especially suited for the determination of tensile, elongation, hysteresis, or fatigue, or repeated loadings and unloadings of rubber thread, single ends of textile yarn, or other materials requiring a machine capacity of 20 pounds or less. The incline plane principle eliminates all questions of influence on the apparent strength or elongation results due to varying specimen lengths or elongation qualities. It applies to the specimen a definite amount of load per unit of time regardless of whether the test sample is long or short, elastic or rigid, ductile or plastic. This testing machine eliminates conditions inherent in older types of machines which, consisting of a pulling device and a scale, would build up load very slowly at the start of test, but very rapidly as the test-sample hardens at its limit of stretch.

The machine is built on a heavy cast-iron base which can be set upon a bench of suitable height to enable convenient operation. It is four feet high and utilizes floor space six by 2½ feet. The rails upon which the carriage moves are of polished steel, and the wheels of the carriage revolve upon precision bearings. A small motor supplies the necessary power.

This machine gives data not only of tensile strength and elongation but also fatigues or hysteresis at any predetermined load for any number of repeats from which a record of permanent loss, stretch, fatigue, ultimate tensile strength, and total elongation in percentage can be graphically recorded on a rectilinear coordinate ruled chart as a permanent record. Henry L. Scott Co., 101 Blackstone St., Providence, R. I.

Colloid Mill

THE Gaulin laboratory colloid mill for making emulsions and dispersions can handle samples of four ounces or produce up to 15 gallons per hour of a free flowing emulsion. The rotor revolves at a constant speed of approximately 20,000 r.p.m. regardless of load. Water cooling or hot water heating may be used in the jacket of the mill. An air release on the grinding chamber allows all air to be forced out before starting and after filling, thereby eliminating the production of foam. An adjustable grinding gap on the back rotor face opens the gap and causes the rotor to run freely. Adjustment of the treating gap may be made while the mill is in operation. Laboratory Equipment Co.

Extruding Machine

A RECENT patent issued to Vernon E. Royle[1] relates to an extruding machine particularly for the production of tire treads in continuous flat strips of varying widths. The objects of the invention are to minimize distance from the stock screw to the point of extrusion; to provide quickly and easily moving the die head out of position for cleaning or repair; to permit easily locking and unlocking the die head to and from the cylinder; and to provide improved form, construction, and arrangement of the individual parts.

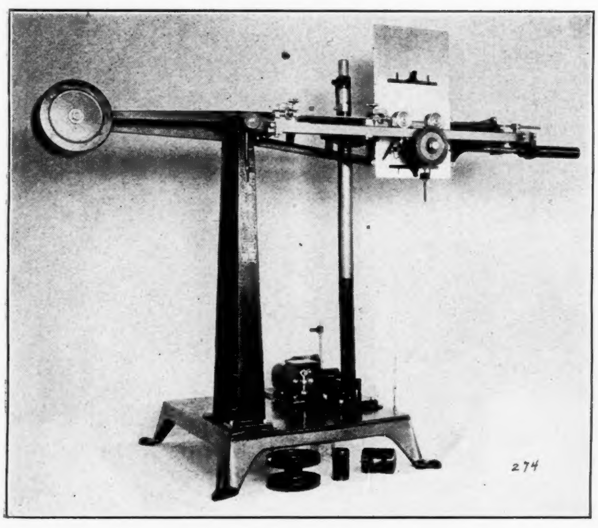
[1] U. S. patent No. 2,061,407, Nov. 17, 1936.

Tire Building Machine

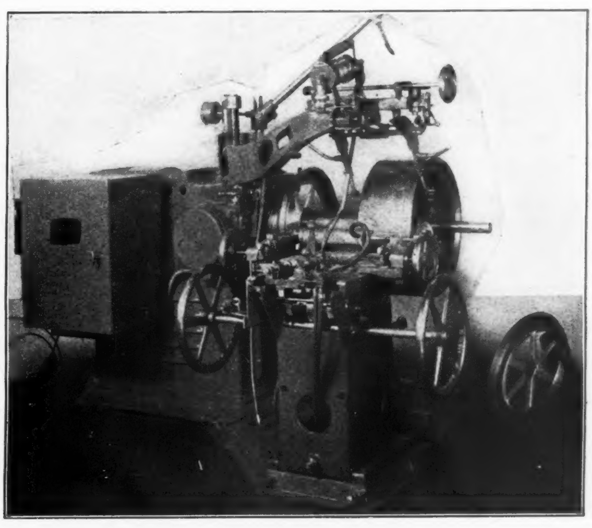
THE heavy-duty drum type (model 36 D) tire building machine illustrated is equipped with a pneumatic stitcher especially designed for work on heavy-duty tire construction of dual and triple beads. It is powered with a special D. C. variable speed motor which gives a wide range of speeds and torque, provides dynamic braking, and has both inching and latching type of foot switches. The power unit is of sturdy construction with a large diameter main spindle and provides suitable distance from the power unit to the center line of the drum and stitcher to accommodate the building of the larger sizes of bus and truck tires.

The spread of the stitcher arms and wheels has been greatly increased. The angle of stitcher wheels in relation to the work is controlled by differential gearing and automatically changes as the carriage is advanced. The stitcher is equipped with a two-pressure operating valve and a lockout or stitcher arm stop so as to hold one side of the stitcher out of operation independently of the other side. The pressure is automatically changed from low to high by the advancing stitcher-carriage as the operation progresses.

The foot treadle for supplying stitcher pressure and the hand wheel for feeding the stitcher wheels across the face of the tread are mounted underneath the pneumatic stitcher. Aluminum spiders are provided for carrying the bead-placing rings, which are piloted on the main spindle of the machine to insure concentric bead location. Additional attachments regularly



Rubber Thread Testing Machine


National Tire Builder

provided include a tread centering device and searing tools. National Rubber Machinery Co., Akron, O.

Electric Vulcanizer

A COMBINATION motor driven oil pressure press with electric heating units in both platens has been especially designed for the manufacture of rubber printing plates which must be made to exact standards of precision. However because of its accuracy and other features of design, this press is particularly suitable for laboratory use, for the manufacture of hygienic rubber articles, or for any other rubber products where precision is essential.

The motor is direct connected to the oil pump, which takes oil from the oil tank in the bottom compartment and delivers it under pressure into a 13-inch ram. A total pressure of 120 tons is available with this press, which has 24 by 24-inch platens. The oil system is equipped with a check valve that closes automatically when the desired pressure is reached and stops the

Heinrich Electric Vulcanizing Press

motor, thus maintaining constant pressure throughout vulcanization without further operation of the motor. This valve can be regulated by a hand wheel to give the desired pressure. A handle at the right opens and closes the pressure release valve.

Electric control of the press consists of two push buttons on the right-hand side which start and stop the motor. On the left-hand side is a switch used to turn on the electric heating units, and a red light shows when the current is on. Automatic thermostatic control on the top platen maintains the temperature constant within a few degrees.

Electric heating units are readily accessible and can be replaced easily. A special alarm clock warns the operator when predetermined vulcanizing time has expired. All control instruments and gages are conveniently located.

Regular equipment includes a thickness gage which shows the exact thickness of the mold or rubber plate being made. Also a complete set of gages is provided to prevent top and bottom platens from being forced too close together, automatically insuring correct thickness. The machine weighs approximately 7,500 pounds, is unusually rigid, and is 3½ feet wide, 4 feet from front to rear, and 5½ feet high. H. H. Heinrich, Inc., 200 Varick St., New York, N. Y.

Tire Repair Vulcanizer

THE increasingly wide use of the low-pressure type of farm implement and tractor tires and the susceptibility of such tires to injury has brought about the development of special new equipment for their repair by James C. Heintz & Co. Owing to the lack of size standardization in such tires the use of the much-to-be-preferred sectional mold was out of the question because of cost. The Heintz company developed its special equipment which consists of a steam bag to furnish heat for vulcanizing the inside of the repair and an automatically controlled, electric-heated spot vulcanizer to be attached to the outside of the repair thereby, in combination with the steam bag, curing the new tread rubber through the hole in the tire. A cloth wrapping retains the tire in proper shape against the pressure of the steam bag.

The advantage of the Heintz apparatus is that it is sufficiently inexpensive as to be within the reach of the average tire service station, simple to operate, and is capable of handling tires of the new and larger sizes.

Shoe Cementing Device

A MACHINE recently patented[1] is intended for cementing the bottom of a lasted canvas shoe prior to the placing of the outsole so as to apply cement to and only to all points of contact between the shoe and the outsole, foxing, toe cap, or other external rubber parts. The apparatus includes a special shaped tank with automatic means of maintaining a substantially constant level of cement into which the shoe is dipped to a predetermined depth; guides to aid in positioning the shoe; wiping means to remove excess cement; and a deeper section of the tank so that the toe of the shoe may be dipped deeper to provide a cement coating where the toe cap is to be placed. The supporting guides are adjustable to accommodate various sizes of shoes.

The cement supply tank is hermetically sealed so that cement within remains fresh and ready for use. At the end of each day only the cement in the dipping tank needs to be removed to prevent hardening. The shoe is manually operated during this process.

[1] U. S. patent No. 2,061,053, Nov. 17, 1936.

Spray Gun for Latex

A NEW Thor model 7-L spray gun has been perfected for spraying latex compounds and finishing materials such as paints and lacquers. The body is made of drop forged aluminum, and the outer surface is protected from fumes and injurious liquids by a black electrolytic coating. The inside of the gun is lined with a special protective material to make it particularly adaptable for the spraying of latex compounds. Binks Mfg. Co.

Thor Spray Gun

"End-Shak" Sieve Shaker

THIS motor-driven machine for testing fine materials is adjustable to hold from one sieve to 13 sieves of eight-inch diameter. It weighs 145 pounds, is 32 inches high, and the base is 22 by 18 inches. The auto time switch automatically controls the period of the test. The nest of sieves can be quickly put in place or removed as they are held in position by a clamping device at the top.

The combined turning and reciprocating motion in the lengthwise direction of the gear box is accomplished without great vibration or sudden jarring motions so as to avoid possibility of the material bouncing on the sieve cloth. This smooth action aids the particles of material to find the openings and increases the sifting efficiency. The constant turning of the sieve, one complete revolution each minute, allows the particles to pass through or

(*Continued on page* 70)

New Testing Sieve Shaker

New Goods and Specialties

Fafnir Rubber Pillow Block

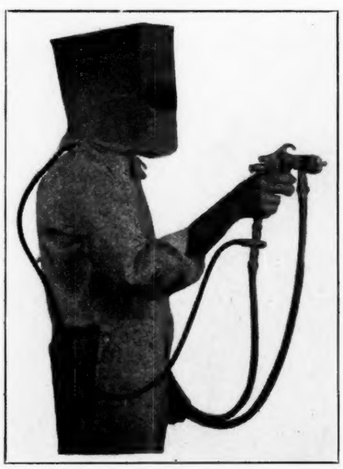
Rubber Pillow Block

A NEW rubber product revolutionary in pillow blocks has been developed for housing ball-bearing units. Hitherto all pillow blocks have been of cast iron or similar metal. The new housings are designed for household and theater air conditioning and ventilating units, and other machinery where absolutely silent operation is required. Fafnir Bearing Co.

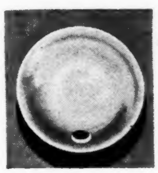
Hood Respirator

ANNOUNCEMENT is made of the development of a new hood respirator especially designed for use in those occupations where there is a fume or dust hazard beyond the protection offered by the more common type of respirator. This new respirator covers the head and neck fully and provides complete protection where ventilation is inadequate or against materials present in the air harmful to eyes, ears, or respiratory organs. Air flows into the hood through an efficient filter, diffuses throughout, and, flowing out through the opening provided for vision, prevents outside atmosphere from approaching the eyes or entering the hood. Thus clear vision without glass or other transparent material to become fogged is provided with perfect safety. The entire unit is composed of a light-weight headgear, air filter, and air hose connected to the air line with a special quick detachable connection, and a light-weight sanitary flameproofed hood supported by the headgear. This hood, fastened around the neck by a draw string, is inexpensive and may be economically replaced by a new one when it becomes soiled.

The new respirator is recommended for use in atmospheres containing offensive chemicals, nauseating vapors, particles of lint, paint spray, dirt, or dust. Offering adequate protection against such conditions, it permits maximum comfort and complete freedom of movement without binding or restricting the operator in any way. The DeVilbiss Co.



DeVilbiss Hood Respirator—Type MPH



Tingle Ball

Improved Home Plate

Musical Ball for Dogs

CANINES are in store for another surprise, Tingle Ball, a new item of The Barr Rubber Products Co., Sandusky, O., which already has thrown a bone, a ring, and a playball, all of indestructible non-poisonous, and chocolate scented rubber, to the dogs. This latest plaything is of hollow construction, molded from durable chocolate scented rubber. A metal bell is sealed inside, and the inviting jingle created by the ball in motion is emitted through a small hole in each end. Tingle balls come in red, yellow, and green.

Sav-A-Leg Home Plate

THE appalling number of broken legs and sprained ankles incurred by baseball players sliding into and catching their spikes on home plate led John O. Seys, vice president of the Chicago Cubs, to invent the Sav-A-Leg Home Plate, made by The Seamless Rubber Co., Inc. The device was adopted by the National and minor leagues.

It consists of a white rubber surface, the same as on the old-style plate, but its main feature is its beveled apron of black rubber sloping off from the sides of the white plate. The apron is covered with dirt when the plate is set in the ground and is said to prevent such accidents because the player's spikes slide up and over the plate instead of checking abruptly against the edge.

Capless Tire Valve

A NEW tire valve embodies a capless tip; yet it is so designed that neither dirt nor water can enter. The valve is claimed to remain tight and leakproof during the life of the tube. There are no replaceable parts as the non-corrosive metal parts are permanently enclosed in the stem, which is made of pliable rubber.

A feature for which the manufacturer claims the promotion of economy and safety is the fact that the all-rubber design of the flexible stem and base prevents the stem from jamming in the rim and allows it to pull through the rim hole when slow deflation takes place in case of a puncture. This construction eliminates the chance of tearing the tube and causing a blow-out. Jenkins Bros., Bridgeport, Conn.

Jenkins Capless Tire Valve

New Type of Rubber Tile

THE new Armstrong-Stedman rubber tile is distinguished by its non-directional swirl marbling, an exclusive feature, which hides wear and traffic marks. Another feature is the two-tone colors, developed for installations where the decorative effect of solid colors is desired at lower costs than possible with solid colors, which, owing to manufacturing difficulties, cost more. The two-tone colorings also conceal traffic marks more effectively than solid colors. One of the outstanding advantages of rubber tile, in addition to resilience, beauty, quiet, and durability, is the fact that ink and other common liquids can be wiped up without staining the floor, and burns from cigarettes and matches can be removed without marring the appearance of the tile. Armstrong Cork Co.

Rubber Industry in America

FINANCIAL[1]

Unless otherwise stated, the results of operations of the following companies, announced recently, are after deductions for operating expenses, normal federal income taxes, depreciation and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.

Aetna Rubber Co., 815 E. 79th St., Cleveland, O. For 1936: net loss, $10,936, against $81,727 loss in 1935.

Baldwin Rubber Co., Pontiac, Mich. For 1936: net income after $52,310 surtax on undistributed earnings was $483,519, equal to $1.74 each on 278,604 shares, compared with $434,050, or $1.56 each, on 278,611 shares in 1935, after complete conversion of old Class A and B stocks and thereafter a four-for-one stock split.

Collyer Insulated Wire Co., Pawtucket, R. I., and subsidiaries. For 1936: net income, $180,000, equal to $1.20 each on 150,000 shares, compared with $107,055 or 77¢ each on 139,000 shares the year before.

Freeport Sulphur Co., 122 E. 42nd St., New York, N. Y. For 1936: net earnings, $2,007,988.60, equivalent to $2.43 per share on the common stock after provision for preferred dividends, compared with 1935 net earnings of $1,492,108.56, or $1.78 per share on the 796,371 shares of common stock. The net for 1936 was after all charges, including depreciation, depletion, and federal taxes and after provision for Freeport's share of the losses of its subsidiary, Cuban-American Manganese Corp., amounting to $191,185.22. The 1935 net earning figure, however, was before deduction of losses of Cuban-American Manganese Corp., amounting to $64,910.03.

The Goodyear Tire & Rubber Co., Akron, O. For 1936: net consolidated earnings, $10,831,031, an increase of $5,378,791, or 98%, over earnings of $5,452,240 in 1935. Earnings for 1936 amounted to $3.90 a share of common stock outstanding. Consolidated sales of Goodyear and subsidiaries for 1936 were $185,915,674, against $164,863,974 for 1935, a 13% increase. The consolidated balance sheet, as of December 31, 1936, showed current assets of $114,233,676, including cash on hand of $13,078,142. The company had no bank debts, and its ratio of current assets to current liabilities was over 13 to 1. Inventories of raw materials and finished products, amounting to $75,693,446, were carried at cost or market, whichever was lower. Since market levels of principal raw materials, notably crude rubber, have risen substantially during the year, no inventory adjustments were necessary. Net working capital totaled $105,664,182, as compared with $98,456,388 a year ago, an increase during the year of $7,207,794.

The balance sheet as of December 31, 1936, reflected changes growing out of the plan for the rearrangement of the company's capitalization. As of December 31, 1936, 638,322 shares, or 85%, of second preferred stock had been exchanged for new $5 convertible preferred stock and common stock under the terms of the plan. Since the end of the year, however, additional shares of second preferred stock have been received for exchange, so that at the present time less than 70,000 shares, or less than 10%, of the issue remains outstanding.

The B. F. Goodrich Co., Akron, O. For 1936: net profits, $7,319,507, compared with $3,429,781 in 1935. The 1936 net earnings amounted to $4.03 per share of common stock. Consolidated net sales totaled $141,097,136, an increase of 17.6% on a comparable basis with the previous year. Raw materials on hand and material contents of finished and unfinished goods were valued at the lower of cost or market on December 31, 1936. Raw materials under contract were at prices below market prices on December 31, 1936. Total current assets at the close of the year amounted to $82,276,928, and current liabilities to $14,949,958, a ratio of 5.5 to 1. Net current assets increased $12,677,862 during the year.

Hewitt Rubber Corp., Buffalo, N. Y., through President Thomas Robins, Jr., announced that at a special meeting January 28 stockholders took steps to authorize the issuance of two shares of common stock of the par value of $5 each for each share of the par value of $10 now outstanding. The stockholders also approved the sale to an underwriting group headed by F. Eberstadt & Co., Inc., New York, N. Y., and including Carlton M. Higbie Corp. and Alison & Co., Detroit, Mich., of 52,000 shares of the new common stock. The company expects shortly to file a registration statement under the Securities Act of 1933, after the effectiveness of which it is anticipated that the underwriting group will offer the new common stock publicly. Out of the proceeds of this offering the company proposes to redeem all its outstanding bonds and debentures. Following the offering, the capitalization of the company will consist solely of common stock of which there will be outstanding 168,188 shares.

Phar's Tire & Rubber Co., Newark, O. For 1936: net income, $240,888, after all charges and taxes, compared with $51,405 in 1935. Total assets on December 31, 1936, were $2,068,199.

The company has filed a registration with the Securities & Exchange Commission covering 300,000 shares of capital stock at a par value of $1 and warrants to purchase 50,000 shares of capital stock. Of the capital shares registered 72,076 are offered by G. L. Ohrstrom & Co., Inc., New York, to present stockholders; 58,555 shares are offered by Ohrstrom's for the account of the company; 50,000 shares to be reserved for exercise of the warrant; and the remaining 119,368 shares will be unissued. Of the warrants registered, 29,000 shares will be issued to President Carl Pharis and 25,000 shares to Ohrstrom. Capital shares were offered publicly February 18.

Raybestos-Manhattan, Inc., Passaic, N. J. For 1936: net income, $1,691,496.40, or $2.66 per share, after providing $687,695.49 for depreciation, $405,602.17 for federal and state income taxes, $132,000.00 for the surtax on undistributed profits, and paying $139,103.71, or the equivalent of 22¢ per share, to employes at Christmas. Total assets at December 31, 1936, amounted to $18,839,512.36, including $9,548,237.86 of current assets, equivalent to five times the current liabilities. There were no banking, or funded debt, or other capital obligations outstanding.

United Carbon Co., Charleston, W. Va., and subsidiaries. For 1936: net profit, $2,202,850 after depreciation, depletion, minority interests, federal and state income taxes, and $53,000 surtax on undistributed earnings. The profit is equivalent to $5.54 each on 397,885 shares of no-par common stock outstanding. In 1935 the net profit amounted to $1,872,405, or $4.70 a common share. The balance sheet as of December 31, 1936, shows current assets of $2,752,369 and current liabilities of $912,199, compared with $2,629,491 and $949,622 respectively at the close of 1935. Cash increased to $854,172 from $766,043. Inventories of $486,711 compared with $704,324 on December 31, 1935.

United Elastic Corp., Easthampton, Mass. For 1936: net income, $99,436, equal to 63¢ each on 156,640 capital shares, against $82,423.

"Dividends Declared" on p. 80.

EASTERN AND SOUTHERN

BUSINESS gains throughout the nation are impressive, especially in the South. While buying showed a seasonal decline in some wholesale lines, manufacturers continue operating at capacity to fill orders for merchandise for the spring. A large number of buyers from the Ohio Valley flood areas visited wholesale markets to replenish stocks destroyed by water. All over the country mild winter has materially aided building operations, with some sections expecting a record peak.

The demand for machinery is fast growing. There has been an increase in the number of new products on the market, as well as improvements in the machines that make old ones. Even machines that make machines are in an unusual state of obsolescence; consequently new orders from this source should prove substantial. Piled on to this normal demand is the need of plant rationalization. To offset higher wages manufacturers will seek labor-saving machinery. This policy involves not just replacing worn machines or parts, but the adoption of entirely new and more efficient types.

Traffic Regulation on Tires for Repair

"Traffic Bulletin No. 154" distributed by The Rubber Manufacturers' Association, Inc., 444 Madison Ave., New York, N. Y., to its members states that effective February 28, tires shipped to factories or repair stations for repairs or retreading will be charged freight rates on less than carloads 30% under the rates on new tires and on carload shipments, minimum 30,000 pounds, 25% under the rates on new tires. However after these tires have been repaired or retreaded they will continue as in the past to come under the new tire freight rates.

Effective February 28 tires being returned for repair or retreading should be described as "Tires, Rubber, and Parts: Pneumatic, old used, having value only for repair" when delivering shipments to the carriers for transportation.

Rates on tires being returned for repair should not be confused with the rates applicable to scrap rubber, which should continue to be described as "Scrap Rubber" so that proper rates will be applied to that class of material and thereby avoid the possibility of misbilling, which is a violation of the law.

Notion Show

The second National Notion and Novelty Exhibit was in progress the week of February 8 at the Pennsylvania Hotel, New York, N. Y., with 150 exhibitors, approximately 30% over last year. Buyers had a keen interest in the display, and the volume of orders placed was reported unusually gratifying, which fact was indicative of the improved retail business conditions.

Predominant among the rubber goods shown were the assorted and well-planned displays of the 1937 line of bathing suits, bathing caps, beach shoes, rain capes, and aprons. Latex articles were very much in evidence. Among the exhibitors of these lines were Seamless Rubber Co., New Haven, Conn.; Climax Rubber Co., 1350 Broadway, New York, N. Y.; Plymouth Rubber Co., Canton, Mass.; I. B. Kleinert Rubber Co., 485 Fifth Ave., New York; and United States Rubber Products, Inc., 1790 Broadway, New York.

Edmont Mfg. Co., Coshocton, O., presented a complete line of latex-coated fabric gloves for men and children and for women around the household.

H. A. Enrich, of New York, displayed zipper garment protecting bags, pocketed shoe bags, and rigid hat boxes with one window side, all of fabric coated with blue rubber of a velvety finish. In addition to being useful, these articles are very attractive.

Daily fashion shows sponsored by the Kleinert company and featuring the original designs of American dress creators marked the 1937 promotional campaign for Kleinert Braforms.

An extensive showing of De Calcomania labels embodying elasticity for use on rubber products was presented by Meyercord Co., Chicago, Ill.

General Dyestuff Corp.'s New Home

On February 3, General Dyestuff Corp. entertained as its guests representatives of the chemical and chemical processing trade press for the purpose of inspecting the company's new laboratories, offices, and warehouse at 435 Hudson St., New York, N. Y. The entire building consisting of nine floors, 200 by 125 feet, houses the laboratories on the top floor, executive, sales and distribution offices on the seventh and eighth floors; while the lower six floors are devoted to warehousing and shipping.

After being greeted by E. K. Halbach, president of General Dyestuff Corp. in the executive offices, the party was conducted to the office of W. H. Cotton, director of the laboratories. Dr. Cotton explained the purpose of the laboratories as threefold: to conduct research work on new products as required by the consuming industries; to control the quality of standard commercial materials in order that industrial consumers of the company's dyestuffs and related chemicals might be assured of uniform materials in keeping with samples previously submitted; and to aid the firm's customers with specific problems in processing new materials. Dr. Cotton said that because of this close correlation of the three phases of laboratory activities, his organization was able to gain valuable information which would broaden its

General Dyestuff Laboratory Offices and Textile Laboratory

usefulness as the entire facilities of the laboratories were offered to industrial consumers of dyestuffs and related chemicals.

Dr. Cotton and H. E. Hager acted as guides to the two groups for inspection of the many operations in progress on a laboratory and small factory basis. A staff of approximately 125 is maintained in laboratory work, which is divided into individual groups dealing with textiles, paper, leather, printing ink, and other articles.

Equipment is of the highest quality and most modern design. Stainless steel is used for sinks, sterilizers, washers, and for beakers and other utensils, where practical. Drain pipes are of chemically neutral material. Chromium rolls are employed for printing fabrics. The paint on walls and equipment is neutral gray, optically as neutral as possible, and the floor of the laboratory is of acid- and alkaline-proof tile. Electric heat is used in all laboratory equipment.

The offices are spacious, neutral gray in color, and the floors are covered with rubber linoleum. All desks are steel with linoleum tops. Partitions in offices and laboratory are constructed of glass bricks, which transmit 86% of the light but very little visibility, to interior rooms. A small room in the center of the building completely walled in with glass brick demonstrated effectively the benefits of this construction as it was possible to read without the use of artificial light. All ceilings are of soundproof material. Acoustic properties are very fine, and during operation of equipment and 125 laboratory operators there is a quiet atmosphere conducive to diligent, concentrated work.

One of the warehouse floors is bonded under the United States Treasury and is under constant supervision of a customs guard. A remarkable feature is the color mixing room, air conditioned so as to eliminate excess particles in the air.

After the tour, the visitors were guests of executives to the company at the Lafayette Hotel. The complete program indicated the presence of thoroughness and concentration by the entire organization.

Greater New York Safety Council, Inc., 60 E. 42nd St., New York, N. Y., will hold its eighth annual convention at Hotel Astor, New York, April 13, 14, and 15. A program of approximately 40 sessions covering every phase of accident prevention work has been developed for the benefit of 7,000 who will attend this annual meeting. Sessions devoted to rubber will take place the afternoon of April 14 and the morning of April 15.

The Hohwieler Rubber Co., manufacturer of molded rubber goods and other specialties, Morrisville, Pa., reports its production has doubled during the past year. The concern ships a large volume of business to the Pacific Coast.

U. S. Rubber News

United States Rubber Products, Inc., 1790 Broadway, New York, N. Y., at its Naugatuck, Conn., plant is swamped with orders, especially from the Ohio Valley flood area. Demand is great for boots, rubbers, galoshes, etc., and the entire stock of rubber boots is reported cleaned out, even fishing boots usually held for the fishing season. Heavy rains throughout the nation have increased the demand for U. S. Gaytees and rubbers.

The fifth annual series of quality contests is now in progress at the Naugatuck plant. Present plans call for contests during February, March, and April with a Quality Party at the end of each month to which the winners will be invited. The contests are founded on a handicap basis, and each unit in the plant is given a budget based on past performance which gives all units an equal chance to hit it. Approximately 250 operators will be declared winners.

Friends and associates of George A. Smith, assistant manager of mechanical goods, Hudson St., N. Y., branch, United States Rubber Products, gave him a dinner January 29 in honor of his fifty years of service with the company. Mr. Smith joined U. S. Rubber in January, 1887, as assistant manager, city sales. In 1907 he became city sales manager and in 1931 was appointed to his present position.

H. M. Frecker, of the development department, U. S. Rubber, Passaic, N. J., recently was appointed chairman of the technical group, Mechanical Goods Division, The Rubber Manufacturers' Association, Inc., 444 Madison Ave., New York.

Thomas F. Russell was appointed industrial relations manager for the Passaic factory of United States Rubber Products, effective February 1. Mr. Russell has been connected with the Passaic organization for the past thirteen years and has a well-grounded knowledge of mechanical rubber goods activities as he has been associated with a number of the manufacturing departments. His promotion was the result of the resignation of Walter D. Stearns, who entered the employ of the company in 1930.

E. M. Cushing, of the rubber company's Indianapolis, Ind., branch, recently was elected president of the Personnel Association of Indianapolis, of which he was the retiring treasurer.

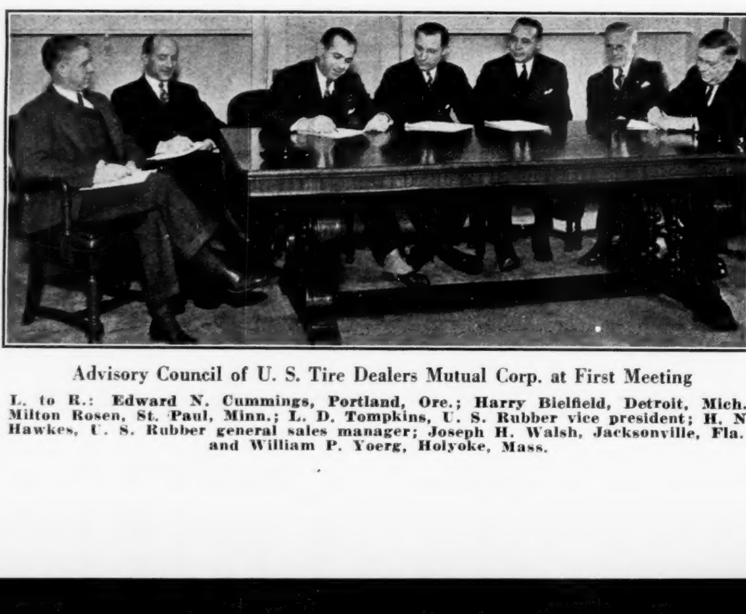
W. E. Nelson, of the company's Portland, Ore., office, lectured last month at the canning course in the horticulture building, Corvallis, Ore., on mechanical rubber goods and their use in relation to mechanical operations.

U. S. Tire Dealers Mutual Corp.

Executives of U. S. Tire Dealers Mutual Corp. on January 25 and 26 held their first meeting with the company's newly appointed Dealer Advisory Council, and a program was formulated whereby dealers may cooperate to their mutual benefit with the company. This meeting, at the company's home office in New York, marked the first time in the history of the tire industry that management sat down with an official group of dealers to discuss common business policies. It was hailed by council members as one of the most progressive steps taken in the industry in many years.

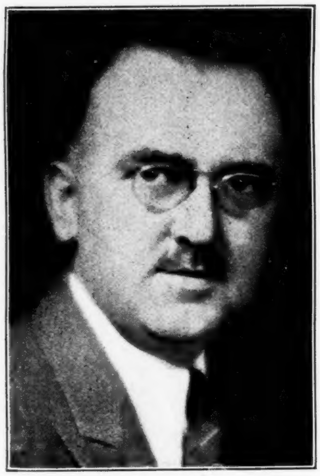
The general discussion was comprehensive, including products, sales policies, service facilities, advertising and merchandising materials, and a program for the development of the established "U.S." dealer. The theme which ran throughout the two-day conference was one of increased efficiency and economy in distribution.

Dealers were advised to control systematically their buying and stocking of tires and thereby reduce the wasteful expense to them and to the U. S. Tire Dealers Mutual Corp. involved in "returns and exchanges." Careful stock keeping will further increase the dealer's return on his investment. The cost of handling returned goods at branches may seem of small consequence in individual instances, but the over-all cost is large and will represent a burden to the Mutual company unless through better planning of stock orders dealers determine to do away with the cause of these expenses.



Advisory Council of U. S. Tire Dealers Mutual Corp. at First Meeting

L. to R.: Edward N. Cummings, Portland, Ore.; Harry Bielfield, Detroit, Mich.; Milton Rosen, St. Paul, Minn.; L. D. Tompkins, U. S. Rubber vice president; H. N. Hawkes, U. S. Rubber general sales manager; Joseph H. Walsh, Jacksonville, Fla.; and William P. Yoerg, Holyoke, Mass.



Joseph M. Kerrigan

Industrial Engineer

Joseph M. Kerrigan is a native of Springfield, Mass., where he was born June 9, 1898. He received his professional education at Rhode Island State College, Kingston, R. I., where in 1916 he received a B.S. in industrial engineering. From 1916 to 1918 he was in the United States Army. He was associated successively as an industrial engineer with the following concerns: Twiss Industrial Engineering Corp., (1918 to 1920); Cheney Silk Corp., South Manchester, Conn., (1920-1923); J. T. Woods Corp., Canada, (1923-1926); U. S. Rubber Reclaiming Co., Buffalo, N. Y., consulting industrial engineer (1926-1927), manager of industrial relations since 1927.

He holds memberships in American Society of Safety Engineers; American Society of Industrial Engineers; chairman, Rubber Section, National Safety Council, and North American Writer's Guild. His home address is 295 North Dr., Buffalo, N. Y.

E. R. Bridgwater, division manager, Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., on February 10 sailed for Europe where he expects to combine pleasure with business during his visit in England, France, and Germany. While Mr. Bridgwater is making the trip primarily in connection with du Pont's interests in the chemical industry, he anticipates an opportunity to visit a number of rubber factories while abroad. It is expected that he will return during the latter part of March.

Lee Rubber & Tire Corp., Conshohocken, Pa., held an annual stockholders' meeting January 28 at which Chairman John J. Watson announced profit for the first two months of the current fiscal year was estimated at $148,000, while the same period of the previous year showed a loss. Mr. Watson further declared the plants were running at capacity. Robert P. Rech was elected a director to succeed the late C. J. Cottee.

The National Association of Waste Material Dealers, Inc., Times Bldg., New York, N. Y., will hold its twenty-fourth annual convention and banquet at Hotel Sherman, Chicago, Ill., March 15 to 17, inclusive. The convention and banquet committee, with Louis Lippa acting as chairman and Benjamin Friedman as vice chairman, is meeting extreme interest among members, and indications are that this will be one of the best attended and most enjoyable meetings that N.A.W.M.D. ever held.

Sales Promotion Engineer

V. A. Cosler, sales promotion engineer, Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., is well qualified by long experience and native ability for so responsible a position. He began his successful career in 1916 as a chemist with the Republic Stamping & Enameling Co., Canton, O. The next year he joined The B. F. Goodrich Co., Akron, O., as a chemist, then became manager of mechanical goods compounding, and later technical superintendent of the mechanical goods division. In 1930, however, Mr. Cosler went to the Hewitt Rubber Corp., Buffalo, N. Y., as technical director and four years after signed with du Pont for his present post.

Mr. Cosler belongs to the American Chemical Society; the American Society for Testing Materials, having been on its Committee D-11 for Rubber Products for some time; the Rubber Manufacturers Association, Inc., having worked on its specification committee ten years; the American Petroleum Institute, serving on its belting committee for several years; and Chi Phi fraternity. Mr. Cosler, furthermore, is the author of several papers of interest to the rubber industry.

He was born in Dayton, O., July 18, 1892, and attended Canton, O., High School and Ohio State University, from which he was graduated in June, 1916, after majoring in chemical engineering.

McGeorge, Buffalo

V. A. Cosler

Simon Collier

Well-Known Chemist

Simon Collier, recently placed in charge of the inspection and control department, Johns-Manville Corp., 22 East 40th St., New York, N. Y., has been associated with the rubber industry 21 years and is well known for his contributions in chemical research.

A graduate in chemistry of the Worcester, Mass., Polytechnic Institute in 1916, Mr. Collier was chief chemist for Johns-Manville at the firm's Waukegan, Ill., factories from 1923 until late last year, when he came to the New York headquarters to assume direction of inspection and control for all Johns-Manville factories.

Mr. Collier has also been associated with the Boston Belting Co., Boston, Mass., 1916-18, 1919-20, and the Bureau of Standards, Washington, D. C., 1918-19, 1920-23, where he served in the capacity of associate chemist in charge of physical and chemical testing of rubber goods.

At present he is chairman of the Methods of Analyses Committee, Rubber Division, American Chemical Society. From 1921 to 1923, Mr. Collier served as chairman of the Analyses of Rubber Goods, Sub-Committee X1, D-11, American Society for Testing Materials. He was chairman of the Chicago Group, Rubber Division, A. C. S., in 1932-33, and originated many of its present plans and policies.

Mr. Collier is co-author of numerous papers pertaining to methods of analyses of rubber goods, including Bureau of Standards papers on sulphur and antimony in rubber goods and on testing rubber goods.

The United States Department of Commerce Series of Radio Programs on Great American Industries, broadcast by Harry R. Daniel, of the department, each Saturday from 3:30 to 4:00 p.m. (E.S.T.), which began January 16, has scheduled for March 20 a program devoted to rubber. The programs are broadcast over the Columbia Broadcasting System in a nation-wide hook-

(Continued on page 65)

OHIO

BUSINESS in industrial areas affected by the floods is recovering. Great activity is expected this spring with rehabilitation work. Auto accessory plants, steel mills, and machine tool makers are among those experiencing quickened activity due to the recession of flood waters and the settlement of the automobile strike.

The De Vilbiss Co., Toledo, O., maintains a training school for industrial painters, master painters, automobile refinishers, and all others interested in learning the technique of spray painting and the use and care of spray-painting equipment.

The General Tire & Rubber Co., Akron, on February 15 increased wages of 2,000 employes at the rate of 5 to 8¢ an hour. President William O'Neil at a sales conference in Chicago, Ill., on February 3 announced a 22% advertising increase for 1937. This will be the biggest campaign in the company's history, according to Sales Manager L. A. McQueen. Ralph Herrington was recently named General's advertising manager.

Laboratory Manager

Robert Vernon Yohe, native of Peru, Iowa, was born August 1, 1906. He was educated in East Des Moines High School, Drake University, and University of Minnesota. He graduated A.B. from Drake in 1927 and received doctorate (Ph.D.) at the University of Minnesota in 1931. He went at once to The B. F. Goodrich Co., Akron, where he was a research chemist (1931-1935) and became production chemist in 1935. He recently advanced to the position of manager of the Goodrich general chemical laboratory. Dr. Yohe belongs to Alpha Chi Sigma and to the American Chemical Society. His home address is 2053—24th St., Cuyahoga Falls, O.

Robert V. Yohe

Goodrich Activities

The B. F. Goodrich Co., Akron, recently purchased the factory site and building formerly occupied by the Acme Motor Truck Co., Cadillac, Mich. The building contains approximately 100,000 square feet of floor space. Work will be started at once to fit the building for the manufacture of a general line of rubber goods.

Goodrich, effective February 15, raised wages of 10,000 workers 5 to 8¢ an hour.

At a meeting of the directorate February 16, S. B. Robertson, for many years vice president and general manager of the tire division, was elected executive vice president of the company and a member of the board, in the latter capacity succeeding George M. Moffett, resigned.

Goodrich recently announced a national letter writing contest for American farmers on "Why I Should Like to Have Rubber Tires on My Tractor and Farm Implements." The contest for a first prize of $1,000 and 489 other cash awards aggregating $3,000 opened in February to close March 31. It is estimated that at least 52,000,000 steel wheels are now in farm service, and in almost all instances rubber tires could replace this equipment with marked advantage, Goodrich maintains.

Tire Cost 30 Years Ago

The average American motorist's tire bill will be about $15 during 1937, or less than 8% of the car owner's expenditures for tires 30 years ago, according to a recent survey by Goodrich. In 1907, the average owner of an automobile required at least five new tires annually to keep his car in running order and average tire mileage was then only about 3,000 miles. A tire and tube cost approximately $44 a wheel in those days; so the motorist's yearly outlay for rubber was more than $200. Owing to improvements in tire quality resulting from years of research and development, the owner of a modern automobile will need only 1.3 tires for his car this year.

Battery Mileage Guarantee

Goodrich recently announced an increased mileage guarantee on Goodrich Kathanode batteries as follows: 1. Heavy-duty type for trucks and buses raised from 18 months, or 36,000 miles to 18 months or 72,000 miles. 2. Commercial type for light trucks raised from 18 months, or 36,000 miles, to 18 months, or 54,000 miles. 3. Passenger-car type used in commercial service raised from 18 months, or 36,000 miles, to 18 months, or 54,000 miles.

These changes do not affect in any way the guarantee "guaranteed as long as you own your car" which applies to Goodrich Kathanode Electro-Pak batteries in passenger car installations.

Surety Rubber Co., manufacturer of gloves and other safety equipment, Carrollton, through President S. S. Hall, has announced the purchase of the rubberized canvas glove business of the Philadelphia Rust Proof Co., Philadelphia, Pa., and has moved all equipment and stock to the Carrollton plant.

Pioneer Rubber Co., Willard, at a recent stockholders' meeting reported an increase of nearly 35% in total business, with total sales over a half million dollars. The company is in a good financial condition with additions made to assets and working capital. Kenneth L. Milligan, vice president and secretary, in charge of sales, predicted a total business of $600,000 for 1937. Stockholders unanimously reelected the following directors: J. C. Gibson, Mr. Milligan, J. W. Clay, R. K. Williams, and L. A. Swope, who at their meeting reelected Mr. Gibson president and treasurer and Mr. Milligan vice president and secretary.

Raw Materials Manager

Leonard M. Freeman, born in North Lewisburg, O., Sept. 8, 1902, was educated at the universities of Miami, Oxford, and Illinois. He received the degree of B.A. at Miami in 1924 and M.A. at the University of Illinois in 1926. He taught in high school one year (1924-1925) and joined the chemical staff of The B. F. Goodrich Co., Akron, O., in 1926. During half the intervening ten years he was manager of the company's general chemical laboratory. Recently he was named manager of the company's raw materials inspection and development department for the duties of which position he is well qualified by his preceding experience. He is a member of the Masonic order and, as a scientist, is a member of the A. C. S. Mr. Freeman resides at 622 Moreley Ave., Akron, O.

Leonard M. Freeman

Interior of New Bridgwater Machine Plant

Bridgwater in New Plant

The Bridgwater Machine Co., Akron, specialist in rubber manufacturing equipment, is now fully settled and operating in its new plant on Cherry St., on the site where the company was established originally over 35 years ago. The company now occupies in excess of 30,000 square feet of well-lighted unobstructed floor space on one floor, which is a 20% increase over former quarters, and has adequate crane and materials handling facilities available. New machining equipment has been added.

This modern plant with its extensive equipment makes it possible for the company to handle the steadily increasing business not only in tire molds, trimming machines, and other standard equipment, but also to take on the building of special machinery for the rubber industry to which Bridgwater is giving particular attention.

More tire molds were made and shipped in December than in any previous month in the company's history, that record being again broken in January and at time of writing February shipments promise to set an all-time high mark. The working force has been increased more than 50% since moving to the new location.

The new Bridgwater offices at 68 Cherry St., in a separate building adjoining the plant, are spacious, well-lighted, and attractively furnished and decorated.

Firestone News

Firestone Tire & Rubber Co., Akron, has awarded a contract for improvements to its factory at Memphis, Tenn.

Firestone, employing 10,000, on February 15 raised wages, especially for workers in the lower wage rate groups. The company announced a minimum wage rate of 75¢ an hour for men and 65¢ for women. Firestone announced this increase as the sixth since June, 1933. The Los Angeles, Calif., plant was included in the recent pay rise, benefiting 1,500 there.

Warren T. Lewis, Firestone purchasing agent, February 15 was elected a member of Commodity Exchange, Inc., 81 Broad St., New York, N. Y., and corporation privileges have been granted to the company through his membership.

J. Delmonte recently resigned from the physical testing laboratory of the Naval Aircraft Factory, Philadelphia, Pa., to accept a position in the Firestone research laboratories. Mr. Delmonte, who is 26, is a graduate of New York University and Massachusetts Institute of Technology.

Leland G. Frierson, formerly assistant advertising manager at Firestone, has joined the Buffalo office of Batten, Barton, Durstine & Osborn, Inc.

Dayton Rubber Mfg. Co., Dayton, according to President A. L. Freedlander recently bought the plant and equipment of the McClaren Rubber Co., Charlotte, N. C., because the city is a textile center and fabrics enter largely into the manufacture of automobile tires. Mr. Freedlander further indicated that manufacturing operations would be started soon there.

Fremont Rubber Products Co., Fremont, newly incorporated, held its first stockholders' meeting January 18 at which the following directors were elected: McKinley Howard, Robert B. Lucas, Rufus D. Hetrick, Chester A. Culbert, Stanley Surdyk, and O. B. Keplinger. These in turn met and elected Mr. Howard president, Mr. Lucas vice president, and Mr. Hetrick secretary-treasurer. The concern, established in 1920 by the late Lon D. Weber and Mr. Surdyk, who has had 17 years' experience in the rubber industry, was sold last year to Messrs. Hetrick and Howard. The latter served for several years as plant superintendent and chemist for the Auburn Rubber Co., Auburn, Ind.; Goodyear Tire & Rubber Co., Akron, and Blackhawk Tire & Rubber Co., Des Moines, Iowa. The Fremont company makes molded and mechanical rubber goods, automobile parts and accessories, household and hospital necessities, toys, plumbing and hardware supplies, stair treads, sink mats, sponges, etc.

Goodyear Notes

Goodyear Tire & Rubber Co., Akron, last month announced "wage increases for all factory employes in its rubber and textile mills amounting to approximately $300,000 increase in earnings for 1937." The firm has about 15,000 such workers, and the pay rise averages 5 to 8¢ an hour.

Goodyear also let a general contract for a two-story addition, 100 by 100 feet, to Warehouse No. 3 at its Gadsden, Ala., mills, at an estimated cost of $90,000.

President P. W. Litchfield announced on March 1 that as a result of scientific research carried on in the Goodyear laboratories over a period of ten years, a solution has been found to one of the most difficult problems of modern bus and truck transportation. This problem so far as the tire-builder is concerned involves both safety and costs in respect of high-speed runs with heavy loads common today in many bus and truck operations. For these operations, according to Mr. Litchfield, experiments demonstrate that tires made of rayon cords may be expected to give, in some instances, four to five times as much mileage as other tires. Where speed is not excessive and moderate loads are carried, however, as in normal passenger-car use, rayon tires do not surpass the performance of standard tires.

OBITUARY

D. C. Roadifer

DAVID C. ROADIFER, assistant sales manager, The Servus Rubber Co., Rock Island, Ill., since September, 1932, died January 25 after a three-month illness. The deceased, who was born in August, 1885, was a graduate of the Chicago, Ill., grade and high schools and a Mason.

H. K. Raymond

PNEUMONIA caused the death, on January 10 in New York, N. Y., of H. K. Raymond, who retired in 1925 as factory manager and vice president of The B. F. Goodrich Co., Akron, O. Mr. Raymond, who was born in Akron 59 years ago, joined Goodrich in the tire department in 1896. Promotions followed, and he was elected a director in 1916 and vice president in charge of production in 1918. The deceased was also an honorary member of The Goodrich Twenty-Year Service Club.

Surviving are two sons and one brother.

Funeral services were held in Akron. Burial was in Glendale Cemetery.

NEW ENGLAND

MOST leading industries in New England are operating at higher levels than at any time since 1929 although the increased activity of labor agitators, especially in the textile and shoe industries, is causing uneasiness.

One tire manufacturer reported the rate of manufacture for January the same as in December, and it should continue at the same pace for the next three months. Another price rise seems due as the recent price increase was insufficient to cover higher costs of material and labor.

Payrolls for rubber workers in Rhode Island during January totaled $279,232, an increase of 19.1% over the corresponding period in 1936, but 4.9% below the total for December.

Firestone Service Stores, Inc., Providence, R. I., in receivership for some time, was authorized under a final decree entered in Superior Court for Providence County on February 8 by Judge Philip C. Joslin, dissolving the corporation, to give unsecured creditors a 31% dividend. James B. Littlefield, receiver, was allowed $1,597.73 for his services and expenses, besides a former allowance of $1,500 on account. Counsel was allowed $250. The receiver's second and final account showed unsecured claims totaling $106,378.39 including claims of miscellaneous creditors of $727.62; claim of Firestone Tire & Rubber Co. for $78,273.61; and claim of the E. L. E. Corp. for $27,377.16. The receiver's report showed a balance of $35,813.52 on deposit in the Industrial Trust Co. The decree provided for the payment of $225 to the state as a preferred claim for franchise tax for three years, and $990.09 to the city of Providence as a preferred claim for taxes.

Collyer Insulated Wire Co., Pawtucket, R. I., at its annual meeting elected V. C. B. Wetmore president to fill a vacancy caused last June by the death of Howard W. Fitz. Mr. Wetmore was vice president of the company for 18 years. Frank Crook was elected vice president to succeed Mr. Wetmore, and Robert C. Moeller was reelected treasurer and general manager. In his annual report Mr. Moeller stated the company in 1936 had a profit of $178,752, equal to $1.19 a share on the capital stock. Sales last year were $3,865,931, against $2,730,867 in 1935, an increase of 30%.

Armstrong Rubber Co., 475 Elm St., New Haven, Conn., has awarded the contract for the construction of a factory at an estimated cost of $100,000.

General Webbings Corp., Springfield, Mass., installed a new rubber-covering machine for yarn the last of December, the second unit of this type installed in 1936. A calender was added recently, and the number of looms was increased during the year from 16 to 40.

Philip Schidrowitz, prominent British rubber technologist, 57 Chancery Lane, London, W.C.2, England, who recently visited the country, sailed for home from New York on February 5.

The Alfred Hale Rubber Co., North Quincy, Mass. Our item regarding the hundredth anniversary of this company, page 65 of our February issue, was in error when we stated David Roy Cutler is associated with his father, David A. Cutler, in the Hale company. The younger Mr. Cutler is development manager of Kaysam Development Corp., formerly Rubber-Gel Products Corp., North Quincy, a subsidiary of Kaysam Corp. of America, One E. 57th St., New York, N. Y., which is not related to the Alfred Hale Rubber Co.

The Stanley Chemical Co., East Berlin, Conn., has appointed William G. Brown, of Toledo, O., its direct factory representative in the State of Ohio. Mr. Brown was superintendent of finishing for several years with the American National Co., Toledo, and prior to that spent several years in the finishing departments of the Willys-Overland and Dodge Bros. automobile plants.

Hodgman Rubber Co., manufacturer of a wide variety of sporting goods, Framingham, Mass., has appointed Alden Glaze & Co., manufacturers' representative, to handle the Hodgman line on the Pacific Coast, covering territory including California, Nevada, Arizona, Utah, New Mexico, Colorado, Texas, Wyoming, Washington, British Columbia, and Hawaii.

Company President

An interesting and varied career has been the lot of Urban A. Keppinger, president and general manager of United Sales & Mfg. Corp., manufacturer of "Handy Equipment for the Housewife," otherwise known as "Kepp's USAMKO Products," located at 1831-35 N. W. 23rd Pl., Portland, Ore., since its inception in 1933.

U. A. Keppinger

He was born in Brooks, Ore., October 19, 1893, and made his first contact with the rubber industry in 1912 when he was hired as bookkeeper and shipping clerk for the Pacific States Rubber Co., Portland. Two years later he was appointed assistant manager of the American Belting & Hose Co., Portland, now the Griffith Rubber Mills.

In 1917 the United States entered the World War, and Mr. Keppinger enlisted. He served as first sergeant of Company C, 162nd Infantry, in the United States and in France from 1917 to 1919. Mr. Keppinger, incidentally, for three months during 1916 was with the Mexican Border Expedition as a member of the Oregon National Guard.

In 1920 he resumed the pursuit of his formal education and was graduated from Behnke-Walker Business College the following year. Then he attended, successively, University of Washington, University of Oregon, and Oregon State College, specializing in general business courses and commercial law. Oregon State College conferred a B.S. degree upon him in June, 1924.

After obtaining his degree in college Mr. Keppinger was called back to the Griffith Rubber Mills by his intimate friend and the president thereof, Charles R. Griffith, now deceased. Mr. Keppinger subsequently became sales manager, assistant manager, manager, and a stockholder in the company before leaving it for his present connection.

Mr. Keppinger belongs to Alpha Chi Rho, American Legion, Portland Post No. 1, American Institute of Banking, Knights of Columbus, Veterans of Foreign Wars, and Disabled American Veterans of the World War, Portland Post No. 1.

Latex Stabilizer

S 1, a new stabilizer, has been announced as being suitable for use in latex compounds. It is very effective in extremely small quantities, does not induce foaming, and has no effect upon the physical properties or aging of rubber. It is non-staining and imparts no odor to the product.

Nevillite Oil

A colorless hydrocarbon oil is an odorless, tasteless solvent which is stable to light and heat; resistant to alkalis, acids, and brine; insoluble in water; and has the very high boiling range of 300 to 350° C. It is a plasticizer for chlorinated rubber coatings, pyroxylin lacquers, and rubber resin finishes and is adapted for homogenizing emulsions of resin and latex in rubber paints. It has a solvent action on rubber and can be used to plasticize its compounds. When used in enamels, its hardness of film depends on its ratio to other non-volatile components.

MIDWEST

NOW that the automobile strike has been settled, business in the Midwest is picking up. New car sales scored an increase. Buying from flood areas, though good, is not of the proportion expected. The steady to higher prices of zinc, with the advance in lead, has spurred activity in the mineral fields, and nearly all properties not flooded are in operation. Large industrial plants are on good schedules, and smaller organizations are gaining. But unemployment shows small increases. Unfavorable weather, dust storms, and the labor situation in some sections of the Midwest, however, darken the outlook.

Corduroy Rubber Co., Grand Rapids, Mich., on January 25 at a directors meeting reelected the following officers: president, L. A. Brown; vice president, R. C. Murphy; secretary-treasurer, B. T. Schall.

Monsanto Chemical Co., St. Louis, Mo., recently announced new laboratory additions. Its Rubber Service Laboratories Division, Akron, O., formally opened February 2 a new and larger service laboratory to take care of the growing needs and new developments in the rubber industry. The Thomas & Hochwalt Laboratories Division soon will complete a new laboratory building at Dayton, O., which will be approximately 120 feet long and 50 feet wide, with seven laboratories, a balance and instrument room and an air conditioned lecture room. The building will be of concrete and glass brick. Work in these new Dayton laboratories will be devoted principally to physical-chemical projects.

EASTERN

(Continued from page 61)

up. Mr. Daniel speaks from Washington, D. C.; while musical numbers, supplied by Emery Deutsch and his orchestra, are broadcast from New York, N. Y. The idea is the presentation of a human interest story of the origin, development, and record of achievement of the great industries of our nation. Industries already covered include railroads, paint, iron and steel, electrical goods, fish, and automobiles. Copy of any program delivered may be secured from the Department of Commerce, Washington, D. C.

The Rubber Specialty Co., manufacturer of rubber parts for automobile radios, Conshohocken, Pa., had to close because of the automobile strike.

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., has awarded a contract for the construction of a factory addition at Valdosta, Ga., at an estimated cost of $600,000.

Imperial Oil & Gas Products Co. on March 1 moved its general offices to the Grant Building, Pittsburgh, Pa.

NEW JERSEY

THE recent floods in the South and Midwest proved of considerable benefit to the rubber manufacturers in Trenton and vicinity. Plants are receiving good sized orders for suction hose of various sizes. Manufacturers also report business as being generally good in all lines, with an advance in prices due to increased costs of crude rubber and cotton.

The Pocono Co., Trenton, is busy filling orders for the Pacific Coast trade.

Henry A. Cozzens, Jr., superintendent of the American Hard Rubber Co., Butler, recently addressed the fourth annual mid-winter session of the New Jersey Industrial Conference Association.

Dural Rubber Co., Flemington, has closed temporarily, but no date has been set for reopening. The company had been in operation for some time.

Luzerne Rubber Co., Trenton, reports increased hard rubber production.

Essex Rubber Co., Trenton, busy all winter, is optimistic over the future.

Passaic Woolflex Mfg. Co., manufacturer of Lastex woolen fabrics, Paterson, N. J., has appointed James Talcott, Inc., 225 Fourth Ave., New York, N. Y., as factor.

New York Belting & Packing Co., One Market St., Passaic, N. J., through General Manager B. F. Ruether has announced the appointment of Crerar, Adams & Co., 3550-3558 South Morgan St., Chicago, Ill., as distributer of the company's complete line of mechanical rubber goods in the Chicago territory. The firm also named Biggs-Kurtz Hardware Co., Grand Junction, Colo., to handle its mechanicals in that area. N.Y.B.&P. products are sold through distributors only.

Thermoid Rubber Co., Trenton, has enlarged its mechanical rubber goods division to offer more thorough personalized service to distributors. This move has been accomplished through the addition of three new district supervisors. George W. Skirm has been made district manager in the Indiana territory, H. C. Griffen in the New York territory, and S. S. Tower in New England.

Fire believed to have been caused by spontaneous combustion on February 17 destroyed a two-story frame storage building of the Thermoid company. The loss will run into several thousand dollars, as the structure held baled rubber paints, friction fabric, and other supplies. Hard work for nearly three hours on the part of firemen from six companies prevented the flames from spreading to an adjoining building containing a valuable supply of fabric and inflammable fluid. William H. Hall, Jr., general works manager, said the building would be rebuilt.

Morrison Rubber & Packing Co., manufacturer of semi-metallic packing, located in Philadelphia, Pa., a number of years, has moved to Trenton, N. J., and opened an office and warehouse at Canal and Pearl Sts. Thomas Morrison, Jr., is president of the concern, and R. A. Heath secretary-treasurer.

Acme Rubber Mfg. Co., Trenton, had advanced prices of all mechanical goods owing to the higher cost of crude rubber and other commodities The company continues busy in all departments. President Horace T. Cook, who is also head of the Hamilton Rubber Mfg. Co., Trenton, accompanied by his wife and daughter, is spending several months at his winter home at Mountain Lake, Fla.

Pierce-Roberts Rubber Co., Trenton, continues with three shifts although business is slowing up a little. President Harry W. Roberts recently returned from a short vacation in Florida.

Tingley-Reliance Rubber Corp., manufacturer of tire accessories and mechanical rubber products, 6-30 Ross St., Rahway, finds business so good (at present it is about one-third better than it was a year ago) that it has been forced to adopt an extensive expansion program, costing about $35,000, to handle increased output. The firm is building an addition to its machine shop and another to its mill and compound room, and much new equipment is being installed, including a Banbury mixer, some presses, and cutters. Wm. McCollum is president of the concern, and P. N. Furber, vice president.

Whitehead Bros. Rubber Co., Trenton, continues at capacity.

The Laurel Co., Garfield, manufactures erasers, pencil plugs, plumbers' rubber goods, molded specialties, and tubing. Officers include Arthur T. Wickers, president; Arthur Dyer and Edgar Josephson, vice presidents; Charles E. Wickers vice president and treasurer; Louis G. Davenport, secretary and assistant treasurer.

CANADA

Goodyear Tire & Rubber Co. of Canada, Ltd., is erecting a plant addition at Bowmanville, Ont.

Dyers & Rubberizers, Ltd., London, Ont., has leased space at 239 Sorauren Ave., Toronto, Ont., where it will rubberize textiles.

Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., Canada. For 1936: net loss, $108,556, against $152,588 loss in 1935.

Something for Nothing

Anybody who expects something for nothing is all the better for being disappointed; he learns something. *Henry Ford* (*Link Belt News*).

Editor's Book Table

BOOK REVIEWS — NEW PUBLICATIONS

"The Recovery Problem in the United States." The Brookings Institution, Washington, D. C. Publication No. 72. Cloth, 5½ by 8¼ inches. 710 pages, 67 charts. Indexed. The price of this book is $4.

This book is divided into three parts: Part I, "The Sweep of World Events," with five chapters, attempts to make clear the international setting of the disruption which occurred in the United States; Part II, "Readjustment in the United States, 1929-36," with 11 chapters, is a detailed study of the course of depression and recovery to date as related to major aspects of American economic life; and Part III, "Readjustment Required for Recovery," with five chapters, attempts to indicate the primary requirements for stimulating and safeguarding further progress. Appendices A to H inclusive are copiously amplified with statistics on world trends; recovery legislation in fourteen selected countries; employment; production and wages; durable goods; prices; public finance; private debts and interest payment; and international trade and finance.

This volume first examines the maladjustments existing throughout the world which interrupted prosperity and brought on the world-wide depression. It traces the situation during the economy period and analyzes the readjustments which followed. It delves into the trend of public finances, which were vastly different than in previous depressions, and discusses the extent to which the government has substituted itself for the private banker. While the analysis is centered upon the situation in the United States, the American recovery problem is considered in its world setting and in the light of economic changes which have occurred in recent years.

"Coordinated Rate Guide." Consolidated Guide Corp., 153 N. Michigan Ave., Chicago, Ill. This indexed guide, bound in heavy boards, has 1,350 pages containing 3,850 rates with multiple rate quotations and includes comparative rail, truck, express, and parcel post shipping rates from 109 key points to several thousand destinations. Separate sections cover air, water, and foreign parcel post rates. Another section lists cities and towns with the serving rail, truck, and navigation carriers. Its purpose is to supplant the many references formerly necessary for the calculation of a shipping rate and to consolidate into one book with thumb index, the various rate books and tariffs, thus saving time for shippers and receivers.

"The Vanderbilt News." R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. The January-February, 1937, issue is devoted exclusively to Thermax as a loading material in compounds with and without reclaimed rubber. Crude rubber compounds comprise: (1.) a comparison of equal volumes (50 volumes per 100 volumes of rubber) of Thermax, whiting, and clay; (2.) the effect of increasing the Thermax loading to 60, 70, 80, and 90 volumes; (3.) the effect of adding mineral rubber with 80 and 90 volume loadings of Thermax. Also a comparison is shown of increasing Thermax loadings with a standard whiting-clay loading in a reclaimed rubber base compound. Tabulated data and graphs clearly explain comparative costs and the results of various physical tests in which the compounder is interested when selecting a loading material. Some commercial stocks using Thermax for specific purposes are given together with comments as to the characteristics of those compounds. The results of the tests and conclusions are very briefly summarized from the viewpoint of the technician who is interested in volume cost and desirable physical results in the finished article.

"1937 Year Book." The Tire & Rim Association, Inc., 1401 Guarantee Title Building, Cleveland, O. This 86-page book, issued in January, 1937, presents in indexed, tabulated, and readily accessible form the adopted standards, recommended practices, and experimental practices, as agreed upon by the association whose membership is made up of representatives from the manufacturers of tires, rims, wheels, and allied parts. The book classifies tires into the following groups: passenger cars; truck and bus; motorcycle; agricultural; grading and excavating; industrial; and airplane. Information included in the tables covers data on load and inflation, recommended rim for each tire section, cross-sectional limits, standard rim contours, rim gages, valves, and in some groups the tire, rim, and valve equipment for various makes of car. This book should be very helpful in supplying proper information to the manufacturers of equipment and to the distributers of tires and the vehicles on which they are used.

"Rogers Saw and Knife Fitting Machinery." Samuel C. Rogers & Co., 191 Dutton Ave., Buffalo, N. Y. This four-page price list shows photographs, prices, and description of machines for grinding various types of knives and for sharpening and filing saws.

"U.S. Packings." United States Rubber Products, Inc., 1790 Broadway, New York, N. Y., has issued a 112-page manual on the efficient application of industrial packings to the specific purposes for which they were designed. This comprehensive manual is to assist engineers in properly adapting the various "U.S." packings to their specific needs. It gives complete engineering data indicating the various characteristics of each packing. Several special sections are devoted to recommendation charts. A special 12-page engineering section is devoted exclusively to charts listing specific gravities, the temperature of steam at different pressures, Fahrenheit-Centigrade conversion table, metric conversion table, melting points of materials and their weights, and other useful data. The specially indexed and cross-indexed departments include sheet packings, gaskets, rod and plunger packings, hydraulic packings, flax and jute, locomotive and special oil well rotary drilling packings, pump valves, and miscellaneous packings and engineering sections.

United States Rubber first began experimenting in this field in 1856, about 90 years after James Watt first used packing around the piston of his original steam engine. It is only during the last 20 years, however, that packings have been fully recognized as an important phase of industrial engineering. Because of the variety of materials handled in modern industry, these packings of necessity have become highly specialized.

"U.S. Hose Catalogue." United States Rubber Products, Inc., 1790 Broadway, New York, N. Y., recently issued a 1937 catalog of 48 pages, copiously illustrated, which presents the complete line of hose. Among the most important types are air, welding, water, agricultural, spray, lawn, steam, fire and mill, forestry, unlined linen, water suction, agricultural suction, oil, rotary, gasoline, solvent and paint spray hose. A section of the catalog is devoted to hose couplings and fittings.

"Bristol's System of Coordinated Process Control." The Bristol Co., Waterbury, Conn. This four-page Bulletin 479 announces a system for coordinating devices and instruments for regulating separate steps in a production cycle so as to give full automatic control of production processes and by regulation to produce a uniform product.

(Continued on page 75)

Rubber Industry in Europe

GERMANY

Control of Industries

Government control of German industry is becoming ever stricter. The year 1936 closed with an order requiring all with more than 100 kilos of spun cotton yarn in their possession, or expecting delivery of more than that quantity, to register with the Control Bureau for Cotton Thread and Fabric; and the year 1937 opened with another order prohibiting trade in reclaims and preparations from old and waste rubber as well as in ground old rubber and hard rubber dust, unless special permission from the proper authorities has first been obtained.

The German government is leaving nothing undone to enforce the saving of raw material to reduce imports, and the German people are responding with increased effort at finding suitable substitutes.

The announcements in the press of new or extended uses of different domestic materials are becoming more frequent, and one is inevitably driven to think of the war period when substitutes were used on every hand. Most of the latter were quickly and gladly discarded after the war, but the technical knowledge and experience gained in the course of their development was invaluable for later research work. A review of industry during 1936, appearing recently in *Gummi-Zeitung*, showed production of domestic raw materials increased by 103% during the period 1928-1935 and that progress continued at a more rapid rate during 1936.

It will be possible to form an idea of the extent of the work done in recent years from the exhibits at the Leipzig Spring Fair where German raw materials will be specially featured. The different products, the new uses found for them, the equipment required, and the modification in established process which their introduction involves will all be fully demonstrated at the fair. Plastics, of course, will be prominent, and Buna will find a place; no doubt the newer methods of heat insulation will also be shown.

Much attention is being paid to the question of heat and cold insulation in factories and homes, not only to save fuel, but because the basic materials now used are largely of foreign origin. Lately, it is claimed, satisfactory results have been obtained in using peat for making insulating cord. But still more interesting is the work with glass wool; this has been found to have very superior insulating properties and to be correspondingly economical in use. It is also said to absorb noise very well and is recommended not only for heat insulation, but also for soundproofing homes; in fact some houses are already so insulated. It is, of course, expected that glass wool will also find a wide use for insulating purposes in rubber factories.

But it is not only by new developments that Germany is endeavoring to meet the growing shortage of raw materials. Old applications are being revived or extended. Wooden shoes, for instance, have always had a limited use in the country and also in the cities, to save leather shoes when work must be done in dirty or wet surroundings, for instance by laborers in certain industries, for gardening or when backyards have to be washed, etc., in fact under conditions where Americans would be likely to use rubbers. Now with the emphasis laid on economy in the use of imported materials, more wooden shoes are being made and bought than has been the case in very many years.

Manufacture of Belts

At the October 28 meeting of the Hamburg Section of the German Rubber Society, Dr. Werner Esch discussed the manufacture of driving and conveyer belting made of rubberized fabric. Starting from 1834 and the Roxbury India Rubber Factory in Roxbury, Mass., the first American rubber factory, Dr. Esch reviewed the older processes, referring to old publications long since out of print, to show how the industry has in recent years actually gone back to formerly approved methods which, however, had been discarded many decades ago. Thus the method of making belting by superimposing flat plies of rubberized fabric without folding them, is a return to a method that, according to Dr. Chr. Heinzerling,[1] was customary in 1883. Similarly there is a general revival in the practice, found advantageous many years ago, of using for rubberizing, mixes that flow well under the influence of the heat of vulcanization; the method of vulcanizing belting in a curved state on drums, reintroduced a few years ago, is almost 100 years old, while the mix that Charles Goodyear used for rubberizing showed the retarded onset of vulcanization which of late has again been recognized as important.

Henri Leduc's method of radio vulcanization[2] was not gone into as no conclusive testing results could be procured in Germany. However a different electrical method, patented[3] by the A/S Den Norske Remfabrik, Oslo, Norway, was fully discussed because of its obvious advantages. This process has been successfully used in the Oslo works for the past two years. The new apparatus consists essentially of two drums of 150 cm. diameter. A steel band of suitable width and a non-conducting intermediate layer are wound around the first drum and electrically preheated. Then the belt is wrapped around the second drum together with the steel band, the latter being under tension of about 10,000 kgs.; the belt lies between the layers of the steel band and thus gets the necessary pressure. As soon as the heat at which vulcanization sets in is obtained, current can be considerably reduced, or at times cut off altogether, because vulcanization is an exothermic process and heat is liberated in the mix during cure. At times the heat may be observed even to increase a little after current has been cut off. Because of the compact form in which the belt is cured, the liberated heat is not so readily dissipated as when belting is cured flat and can thus be utilized for furthering the vulcanization process. Consequently curing can be completed with exceptionally low heat, and every excess of vulcanization can be very simply excluded no matter how thick the belt may be or how sensitive to heat the fabric. A belt or conveyer of 100 square meters can be completely vulcanized in a single operation within 75 to 90 minutes including preheating of the steel band, wrapping of the belt and steel band, the actual curing process and unwinding of the cured belt. The entire length of the belt is uniformly stretched in a curved condition so that internal displacement in belting made according to this process is impossible. Belts cured in this way show a reduction in bending strain of about 50% as compared with flat cured belts.

Besides the very low energy requirement, uniform curing, improved quality that go with this new method of making belting, the system has an additional advantage for Germany in that it seems to offer the most favorable conditions if and when it should become necessary to replace cotton by artificial silk for belting.

Incidentally, Dr. Esch has for some years been experimenting with the use of German artificial silks instead of imported cotton. Hitherto little suc-

[1] "Die Fabrikation der Kautschuk und Guttapercha-waaren," pp. 75, 76, 121.

[2] "Homogeneous Vulcanization," INDIA RUBBER WORLD, Feb. 1, 1936, p. 44; Mar. 1, p. 49.

[3] D.R.P. 640,178.

cess attended these efforts, partly because the different textile technique required for treating artificial silk had to be learned, an endless artificial silk with special combining tendency had to be developed, and rubber mixes had to be worked out less sensitive to the traces of copper impurities present in certain types of artificial silk. For some time now, however, belts of rubberized artificial silk have been running with, it seems, unexceptional results.

IRELAND

A policy of protecting prices and terms for tires in North Ireland was recently adopted in Belfast by the following manufacturers: Avon Tires (North Ireland) Ltd., British Tire & Rubber Co., Ltd., Dunlop Rubber Co., Ltd., Firestone Tire & Rubber Co., Ltd., Goodyear Tire & Rubber Co. (Great Britain), Ltd., India Tire & Rubber Co., Ltd., Michelin Tire Co., Ltd., Pirelli, Ltd. All the giant tires manufactured and most of the car tires will be protected except Avon "Ranger," Firestone "Oldfield," Goodyear "Pathfinder," British Tire "Cavalier," India "Sterling," Pirelli "Wayfarer." According to this agreement, it is prohibited to advertise tires either through the press or by circulars at prices other than those fixed by manufacturers as current retail prices. Protection will be rigidly enforced by the Motor Trade Association.

The quota for imports of rubberized fabrics into the Irish Free State has been fixed at 900,000 square yards for the period February 1 to July 1, 1937.

HOLLAND

A new process for preparing powders from dispersions of rubber and artificial resin, for which greater simplicity is claimed, has been developed and patented in the Netherlands by Prof. Hein Israel Waterman, of Delft, Cornelus van Vlodder, of Rotterdam, and Allert Reinder Veldman, of Delft. The novelty of the method is that the artificial resin and rubber dispersions are used in a state where a powdery precipitate cannot be obtained from each dispersion by itself by the simple addition of coagulant without further dilution of the respective dispersion. But it was found that if the two dispersions are combined, no further dilution is necessary; it suffices to add coagulant and stir the whole to obtain a fine precipitate of mixed rubber and resin which can be filtered off from the aqueous solution, washed with water, and dried in a vacuum at low temperature. The product thus obtained can be used as a molding powder. Suitable fillers, as wood flour or asbestos, besides pigments, sulphur, and accelerators, can be incorporated by suspension in either of the dispersions or in the combined dispersions, before coagulant is added.

GREAT BRITAIN

I. R. I. Meetings

The program of activities of the Institution of the Rubber Industry for February included:

February 4: Meeting Midland Section, Birmingham. Paper by D. Parkinson and J. S. Tidmus on "Some Applications of the Microscope to Rubber Technique."

February 6: Annual dinner of the Scottish Section, Glasgow.

February 11: Meeting London Section. Paper by A. van Rossem on "The Oxidation of Rubber."

February 12: Meeting West of England Section, Melksham. Above paper by A. van Rossem.

February 15: Meeting Manchester Section. Above paper by A. van Rossem.

February 17: Scottish Section. Junior Short Papers Night. Reading of winning papers for the Committees' Silver Medal Competition.

February 18: Liverpool. Paper by R. C. Davies on "Rubber Footwear."

February 22: London Section. Paper by S. S. Pickles on "Improvements in the Performance and Testing of Rubber."

February 24: Leicester Section. Paper by Maldwyn Jones on "The Correct Use of Antioxidants."

February 25: Meeting Midland Section, Wolverhampton. Paper by G. H. Gaites on "Development of Automatic Temperature Control for Vulcanizers and Calender Rolls."

February 26: Leicester Section. Third annual dinner.

British Notes

A symposium on plastics, arranged by the Plastics Group of the Society of the Chemical Industry in conjunction with the Institute of Plastics Industry and the British Plastics Federation, was held in London, January 29. The purpose of the symposium was to discuss the "importance of plastics to the nation and in particular the situation of the industry and what it could contribute in time of war." Three groups of papers were read, covering: I, resins for paints and varnishes, natural resins and shellacs, bitumens; II, casein plastics, cellulose ester plastics, cellulose ethers; III, phenolic and cresylic types of plastics, amino type plastics, newer synthetic plastics.

An enterprising London firm has developed a system of what might be called sectional seating for cars, from Dunlopillo material. For this purpose the material is made in standard units which can be interlocked and held in place by a key bar of similar or other appropriate material; any empty spaces at the rear, front, or sides are filled in with suitable material. In this way car manufacturers and others can easily build up seating of any required dimensions or shape from a limited number of standard units. Another advantage of this system, which has been worked out by Messrs. Fabram, of Station Works, London, W.C.1, is this: since each unit is largely independent of the others, shock or weight on a given section is confined to that one, while the rolling tendency is also reduced.

Henley's Telegraph Works Co., Ltd., recently celebrated the centenary of its foundation. A thanksgiving service to commemorate the event was held January 1 at the Church of St. Sepulchre, Holborn, at which 1,000 members of the staff of the head office, works, and laboratories, and of the subsidiaries, Henley's (South Africa) Telegraph Works Co., Ltd., Henley's Tire & Rubber Co., and the Holborn Construction Co., Ltd., were present. A few weeks later the chairman, Sir Montagu Hughman, presided over a dinner at which again over 1,000 members of the firm and its subsidiaries attended. The principal guest on this occasion was Sir John Simon, Secretary of State for Home Affairs.

In January the government-owned factory at Blackburn for assembling containers of gas masks, or respirators, was formally opened by Geoffrey Lloyd, Parliamentary Under-Secretary for the Home Department. The components of the containers and the rubber face pieces are made by manufacturers in different parts of the country, and the Blackburn factory merely assembles the various parts. These masks are intended for the civilian population. It required much experimental work before government experts succeeded in designing a simplified gas mask that could be put out by the million by mass production methods. But now good progress is being made and lately the output has reached 150,000 gas containers a week; it is expected that this will shortly be increased to 2,000,000 a month. At present there are already hundreds of thousands of containers and millions of rubber face pieces in stock. It is planned to store the finished gas masks in local storage places all over the country so that in case of need, they could be distributed to civilians with the greatest possible speed.

Tire prices have recently gone up, the increase for first-grade automobile tires being 10%, for cheaper automobile tires 5%, giant pneumatics for commercial vehicles 5 to 15%, and motor cycle tires 10%.

Consolidated Rubber Manufacturers Ltd., has increased its registered capital of £600,000 by £100,000 in 100,000 5½% non-cumulative preference shares of £1 each. On December 3, 1936, 1,000,000 ordinary shares of 2s. and 499,000 preference shares of £1 each

(*Continued on page 70*)

Rubber Industry in Far East

NETHERLAND INDIA

According to the Central Bureau of Statistics, the total tappable area of estate rubber only, out of tapping at the end of November, 1936, was 27.7%, against 29.5% the month before.

Final export figures for Netherland India during November, 1936, totaled 30,976,175 kilos. Of this, estate rubber from Java and Madura accounted for 5,500,961 kilos dry, including 15,571 kilos latex; shipments of estate rubber from the Outer Provinces came to 8,850,259 kilos and included 1,138,925 kilos latex. Native rubber exports were high at 16,614,807 kilos. Besides the crude rubber, Java shipped 10,048 kilos in the form of tires.

Preliminary figures set December exports at 27,924,758 kilos, a decrease from the preceding month due entirely to the sharp decline of native shipments, which came to little more than half those of the month before. This drop in native exports, however, was largely offset by increased shipments by the estates.

The International Association for the Rubber Trade on January 12 laid before the Minister for Colonies a request urging the abolition or reduction of the export duty on estate rubber. It was pointed out that foreign estate owners in particular have shown uneasiness over the duty which, in effect, would now amount to a 25% levy on profits; with the existing corporation tax, which already takes 20% of profits, this would mean that rubber companies would have to surrender 45% of their profits to the treasury. It was further brought out that at the present rate the revenue from the export duty for the current year would exceed by 25% the amount the government held necessary the time it introduced the tax, and that this revenue would be at least four times as much in 1938, which was hardly what the government had intended. Reliable reports indicate that the request is being considered and the tax will probably be lowered.

From Batavia it is reported that in view of the strong demand for ready rubber it was decided to issue licenses for estate rubber from the second quarter of the current year before February 10, 1937, on a basis of 80% exportable so as to permit estates to make shipments earlier and thus ease the market situation.

As to native rubber, export licenses for the first quarter of 1937 have been issued on a basis of 70% exportable, less a certain reserve to cover the eventual release of additional amounts later on. Permissible was left at 70% as the notice of the increase to 75% for the first quarter of 1937 had come too late to permit the necessary change being made. But this deficiency will be made good in the second quarter of the year when licenses will permit export of rather more than 85%. To insure more regular production of native rubber during the first half of 1937 and thus improve the situation with regard to supplies of spot rubber on the world market, licenses for April will be issued in the beginning of March, and licenses for May and June outputs a month later.

MALAYA

Present Rubber Situation

During the severe slump from which the rubber industry is emerging producers became so used to a price of 3d. per pound for rubber that the gradual rise to 7d. following the introduction of restriction appeared as the fulfillment of a beautiful dream, and the further spurt to 10d. and over is actually causing uneasiness among producers as well as consumers. There is much talk of imminent shortage of rubber and the development of a rubber boom in the local papers, and warnings not to go too far are being issued. As might have been expected, the International Rubber Regulation Committee is being blamed for not releasing 80% instead of only 75% rubber; at the same time fears are expressed that even if full production were allowed, actual output would not reach more than 80%, and so the clause in the restriction scheme prohibiting planting is quarreled with.

Now as to the price movement, the question seems to be, what is a fair price for crude rubber? When the Stevenson Scheme was in force, ls.6d. was considered a fair price; a year ago, after a prolonged period of severely depressed prices during which estates were enabled to carry on only by undreamed of effort and sacrifice, 7d. per pound was thought good. But the period of abnormally depressed prices is at an end; a greater demand exists for almost all materials, business is more active, practically all commodities are rising to more normal levels, wages are higher, cost of living has gone up. Ideas of profitable price levels are perforce undergoing revision, and rubber will not be excluded from this process. So the industry will, for a time at least, have to get used to a different standard for a fair rubber price, more in keeping with improved conditions.

But it is feared that producers will not be able to meet demand, that there will be a rubber shortage, sending prices to boom levels. Considering that potential productive capacity of existing rubber plantations, both European and native, is well above the present rate of consumption, or even probable consumption for the next several years, there should be no such shortage. There is no doubt that the rubber is there. But the difference between actual and potential output is greatly influenced by economical conditions. Paradoxically, the better conditions are, the harder it is to take full advantage of them, and the wider the gap between demand and production. The reason for this is that in good times there is always a certain relaxation, conscious and unconscious, of effort on the part of the individual, while at the same time there is a shortage of high-grade labor. During the past period of stress, effort in Malaya was largely directed toward producing as much rubber as possible as cheaply as possible, and labor being comparatively plentiful, diligent, and docile because of the hard times, prodigies were performed. Now a revival of business is on, a more optimistic feeling spreads, individual effort relaxes, and output goes down proportionately. This condition is especially noticeable among the native rubber growers in Malaya. To be sure, their outputs do increase under the stimulus of higher prices, but not to the extent expected. The poorer among them prefer to sell their coupons and to increase their earnings by working for others if the conditions are tempting enough. The more well-to-do, on the other hand, leave the work to hired help. There are districts where more than half the area of native rubber gardens is left untapped. So that if production does not appear to meet demand, this is not because there is not enough rubber planted, but because of the times.

Something of this situation was experienced when the Stevenson Scheme was in force. In the boom years it was said estates had been over-assessed, that they could never produce 100% even if permitted to do so. However, when restriction was finally lifted and after prices began to drop, output from

Malaya immediately mounted and reached and remained at an unexpectedly high level.

Notes

Hitherto the use of pneumatic tires for bullock carts in Malaya has been severely hampered by the license fee. In view of the many advantages of using pneumatics instead of the usual iron-shod wheels, the Kuala Lumpur Sanitary Board unanimously voted in favor of reducing fees of pneumatic tired carts.

The Cheviot Rubber Co., Ltd., recently bought an estate of 490 acres of seven-year-old rubber near its Middleton estate in Negri Sembilan. The company intends to increase its present capital to £350,000 by the creation of 1,000,000 shares of 2s. each.

The Bodenach Rubber Co. recently was formed with a share capital of £300,000 in £1 shares. The company has acquired from the Penang Rubber Estates Co. a property in Kedah consisting of 6,955 acres of which 5,234 are planted with rubber. Most of the planted area, 4,876 acres, consists of trees from specially selected seed. About 93% of the trees are nine or ten years old. Standard production for the current year is assessed at 2,621,400 pounds, or at the rate of about 500 pounds an acre.

INDIA

The Dunlop Factory at Sahaganj, the first for automobile tires in India, was declared open by the Governor of Bengal. The company will manufacture automobile tires and also tires for bicycles and for farm use. It plans to produce also mechanical and general rubber goods for which there is a very good market in India. Rubber from South India and Burma will be used, and also Indian cotton. India does not yet produce the special quality of cotton required for tires, but experiments are being carried out, and it is expected that it will be only a question of time before adequate supplies of suitable cotton for the purpose are available from India.

During the six months ended September, 1936, India's imports of covers for automobile tires increased again and were 140,554 covers, value 6,600,000 rupees, against 133,533, value 6,250,000 rupees. Most of these tires came from Great Britain; while shipments from this source and Germany increased, those that came from the United States declined.

Imports of cycle tires also increased from 892,098 covers, value 1,130,000 rupees, to 916,483 covers, value 1,150,000 rupees. The share of the United Kingdom rose sharply from 476,166 covers, value 710,000 rupees, to 641,127 covers, value 930,000 rupees, while that of other countries fell proportionately.

The trade in covers for motor cycles fell from 1,314 covers, value 16,000 rupees, to 1,221 covers, value 16,000 rupees.

GREAT BRITAIN

(Continued from page 68)

had been paid up; of these General Rubber Co. held 720,000 ordinary and 400,000 preference shares; Frances W. Pickett, 250,000 ordinary and 16,800 preference shares; and the United States Rubber Co., New York, N. Y., U. S. A., 29,350 preference shares.

SPAIN

Present conditions in Spain are naturally having an adverse effect on the local rubber industry. The factories in Barcelona have had to slow down to such an extent that not one of them is now consuming more than about a quarter of the normal amount of rubber. Under present circumstances this is probably just as well, for stocks are reported to be so low and there are such difficulties attendant on securing imports of raw rubber that if production were at the normal level, not one kilo of rubber would by now be left in Barcelona.

The difficulty in obtaining shipments of rubber is due to the fact that exporters demand to be paid in advance in their own currency and importers cannot obtain from the government the necessary release of currency as and when they require it. Apart from this, shippers will accept rubber for Spain only if they can get return freight, and even then often land the rubber at Hamburg, Marseilles, or some other European port if it suits them to do so. And this adds extra freight costs to the price of rubber, to say nothing of the delay in shipment.

Of late these troubles have been increased by the rise in the price of the crude material on the world market and the additional rise due to devaluation of the Spanish currency. As *La Goma* points out in its December, 1936, issue, rubber which could be imported for about 5 pesetas a kilo up to November, 1936, sold for 8 pesetas a kilo a month later.

A large part of the rubber, if not most of it, is destined for war supplies, and some months ago all wholesalers and manufacturers of rubber goods in Catalonia were required to register the amounts of rubber they have and to state whether these were in their warehouses or in harbors. Government permission is now necessary before any transactions in rubber can be undertaken.

EUROPEAN NOTES

The Veloromana S.A., Bucharest, Roumania, was recently formed with a capital of 4,000,000 lei and will manufacture automobile and cycle tires.

Electro-Cable reports a credit balance of 4,964,607 francs for the past business year. To this is added the previous carry-forward amounting to 91,225 francs. The sum of 4,500,000 francs was written off, and the remaining 555,833 francs carried forward.

Caoutchouc Reno used its profit of 946,175 francs, booked during the year ended June 30, 1936, to reduce its previous loss, which therefore now stands at 3,466,302 francs.

Etablissements Fournier, Ostertag et Le Boulenger, France, reported for the past business year net profits of 603,448 francs against 618,636 francs the year before. A dividend of 8 francs per share was turned out, against 6 francs in the preceding year.

By a decree of December 31, 1936, vulcanization accelerators are now separately classified in the French customs tariff.

Rubber Sprung Street Cars

A new era of comfort in railway travel with rubber car springs and wheels replacing steel is forecast by the delivery for regular service in Brooklyn, N. Y., of newly perfected street cars which depend entirely on rubber for springing and shock absorption. The design and construction that effects silencing and increase of riding comfort is credited to the research and engineering skill of Dr. C. F. Hirshfield, chief engineer of the Transit Research Corp., in collaboration with Goodrich engineers in perfectly the rubber springs and rubber "sandwiches" for the car wheels. Car lines in Chicago, Pittsburgh, Los Angeles, Baltimore, San Diego, and Brooklyn have ordered nearly 400 of these silent trolley cars on which deliveries are now being steadily increased.

"End-Shak" Sieve Shaker

(Continued from page 56)

roll over the openings from all angles during each revolution.

This machine is called "End-Shak" because it was designed to put through any given testing sieve, in the shortest time, all material that would eventually pass or to reach the end point in as few minutes as possible. Newark Wire Cloth Co.

Acetylene in Rubber

(Continued from page 54)

of ammonia in the manufacture of sponge rubber and sponge rubber goods. Calcium carbide in a saponifiable oil coagulates liquid latex and can also be mixed with latex to produce sponges and spongy articles. It is shown that besides improving the aging qualities of rubber, the use of acetylene gas or calcium carbide helps simplify the manufacturing process and lower costs. Mr. Walter calculated the possible annual consumption of calcium carbide for balls, balloons, sponge rubber, and latex at about 1,500 tons. Finally he stressed the importance of studying the action of acetylene as a rubber coagulant and the fixation of acetylene on reclaims and factices.

Patents and Trade Marks

MACHINERY

United States

2,065,033. **Inner Tube Apparatus.** H. D. Stevens, assignor to Firestone Tire & Rubber Co., both of Akron, O.
2,065,186. **Dental Press Heater.** A. Keil, Berlin, assignor to Heko-Werk Chemische Fabrik A. G., Berlin-Tempelhof, both in Germany.
2,065,380. **Rubber Cutter.** P. W. Lamson, Cleveland Heights, O.
2,065,413. **Bag Sewer.** E. Zimmermann, Kongen, Germany, assignor to Gummi-Tank A.-G., Rubber Tank, Ltd., Glarus, Switzerland.
2,065,448. **Tire Trimmer.** J. A. George, Brackenridge, Pa.
2,065,892. **Leather Substitute Apparatus.** A. J. Hanley, assignor to Respro, Inc., both of Cranston, R. I.
2,065,919. **Inflatable Repair Bag.** J. J. Black, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,065,934. **Condenser Mold.** A. Deutschmann, Boston, Mass.
2,065,943. **Tire Expander.** W. G. Lerch, Akron, and M. T. Bryant, Findlay, assignors to Master Tire & Rubber Corp., Akron, all in O.
2,065,971. **Tire Drum.** L. Herbert, Frankfurt a. M., and A. Fröhlich, Hannover, both in Germany.
2,066,265. **Tire Curing Mold.** H. A. Freeman, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,066,780. **Fabric Coater.** D. S. Holt, assignor to Armstrong Cork Co., both of Lancaster, Pa.
2,067,083. **Bale Cutter.** D. J. Gregory and C. F. Schnuck, both of New Haven, assignors to Farrel-Birmingham Co., Inc., Ansonia, all in Conn.
2,067,140. **Torsion Impact Tester.** R. W. Dinzl, Narberth, Pa., assignor to Baldwin-Southwark Corp., a corporation of Del.
2,067,154. **Inflatable Ball Treater.** B. Kozmer, Chicago, Ill.
2,067,458. **Rubber Mixer.** G. Nichols, Akron, O., assignor to National Rubber Machinery Co., a corporation of O.
2,067,641. **Bead Former.** S. S. Millen, Glendale, assignor to J. Schmid, Los Angeles, both in Calif.
2,067,642. **Stripper.** S. S. Millen, Glendale, assignor to J. Schmid, Los Angeles, both in Calif.
2,067,805. **Circular Rib Knitter.** E. J. Towers, Ruddington, assignor to George Blackburn & Sons, Ltd., Nottingham, both in England.
2,067,900. **Elastic Strip Knitter.** N. O. Brantly, assignor to Penn Elastic Co., Inc., both of Philadelphia, Pa.
2,068,183. **Fabric Adhesive Applier.** L. Kay, Cheetham, England.
2,068,239. **Footwear Mold.** H. Malm, New York, N. Y.
2,068,361. **Hard Rubber Vulcanizer.** H. L. Ward, Chicago, Ill., assignor to Western Electric Co., Inc., New York, N. Y.
2,068,504. **Rubber Cutter.** A. Misch, Bronx, N. Y.

Dominion of Canada

362,765. **Reel Winding Separator.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of F. Zonino, Naugatuck, and A. G. Emery, New Haven, co-inventors, both in Conn., U. S. A.
363,273. **Continuous Article Vulcanizer.** J. H. Coffey, Rhos-on-Sea, North Wales.
363,346. **Container Apparatus.** General Tire & Rubber Co., assignee of H. T. Kraft, both of Akron, O., U. S. A.
363,404. **Material Opening Producer.** Pharis Tire & Rubber Co., assignee of J. E. Warrell, both of Newark, O., U. S. A.
363,562. **Flexible Material Apparatus.** Marathon Paper Mills Co., Rothschild, assignee of A. Abrams and C. L. Wagner, co-inventors, both of Wausau, all in Wis., U. S. A.
363,590. **Rubber Heat Treater.** R. A. Dufour, Paris, and H. A. Leduc, Mantes-Gassicourt, co-inventors, both in France.
363,599. **Bottle Cap Maker and Applier.** J. R. Gammeter, Akron, O., U. S. A.

United Kingdom

451,027 and 451,067. **Slitter.** W. W. Triggs, London. (Cameron Machine Co., Brooklyn, N. Y., U. S. A.)
451,323. **Rubber Clothing Former.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of Soc. Italiana Pirelli, Milan, Italy.
451,361. **Leather Substitute Apparatus.** W. J. Tennant, London. (H. G. Halloran, Boston, Mass., U. S. A.)
451,375. **Knitter.** G. Blackburn & Sons, Ltd., and H. W. Start, both of Nottingham.
451,464. **Bottle Capper.** J. R. Gammeter, Akron, O., U. S. A.
451,607. **Linear Dimension Gage.** Dunlop Rubber Co., Ltd., London, and E. Simpson, A. J. Stubbs, and T. Williams, all of Birmingham.
451,793. **Tire Nonskid Branding Tool.** J. Deas, Walsall.

PROCESS

United States

2,065,069. **Coating Plaster.** G. L. Hadden, S. Orange, N. J., assignor to Doherty Research Co., New York, N. Y.
2,065,180. **Driving Belt.** A. L. Freedlander, assignor to Dayton Rubber Mfg. Co., both of Dayton, O.
2,065,618. **Metal.** C. F. Sherwood, Chicago, assignor, by direct and mesne assignments, of 35% to J. A. Dienner, Evanston, both in Ill., and 65% to Hansen Rubber Products Co., a corporation of Del.
2,065,853. **Pile Fabric.** A. W. Drobile, Wayne, and G. S. Hiers, Cynwyd, assignors to Collins & Aikman Corp., Philadelphia, all in Pa.
2,066,282. **Hosiery.** G. S. Van Voorhis, Northampton, assignor to United Elastic Corp., Easthampton, Mass.
2,066,459. **Asphaltic Storage Battery Case.** E. R. Dillehay, Glen Ellyn, Ill., assignor to Richardson Co., Lockland, O.
2,066,596. **Porous Separator.** A. A. West, W. Oak Lane, assignor to Electric Storage Battery Co., Philadelphia, both in Pa.
2,066,752. **Roll.** S. B. Ward, Portsmouth, N. H., assignor to Stowe-Woodward, Inc., Newton Upper Falls, Mass.
2,066,798. **Rubber Molding.** F. N. Pickett, Westminster, England.
2,067,020. **Expanded Rubber.** D. Roberts, assignor to Rubatex Products, Inc., both of New York, N. Y.
2,067,405. **Cable.** R. Mayne, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,067,667. **Liner Cloth.** M. Keller, Syosset, N. Y., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Wilmington, Del.
2,068,546. **Waterproofing Textile Fibers.** J. F. X. Harold, New York, N. Y.

Dominion of Canada

363,093. **Mat.** J. H. Coffey, Rhos-on-Sea, North Wales.
363,319. **Rubber Thread.** T. L. Shepherd, London, England.
363,384. **Attaching Rubber Soles to Shoes.** Boston Blacking Co. of Canada, Ltd., Montreal, P. Q., assignee of A. D. Macdonald, Malden, Mass., U. S. A.
363,385. **Attaching Leather Soles to Shoes.** Boston Blacking Co. of Canada, Ltd., Montreal, P. Q., assignee of A. D. Macdonald, Malden, Mass., U. S. A.
363,386. **Sole Channel Flap Cementing.** Boston Blacking Co. of Canada, Ltd., Montreal, P. Q., assignee of A. D. Macdonald, Malden, Mass., U. S. A.
363,441. **Reclaiming Rubber Scrap.** Xylos Rubber Co., assignee of R. R. Gross, both of Akron, O., U. S. A.
363,494. **Compressed Leather.** Compagnie Internationale des Cuirs Comprimés Attila C. I. C. C. A. Société Anonyme, assignee of C. Bleyenheuft, both of Brussels, Belgium.
363,502. **Bonding Rubber to Metal.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of B. W. D. Lacey and W. V. Clarke, co-inventors, both of Birmingham, England.

United Kingdom

451,012. **Rubber Film.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands.
451,182. **Compound Sheet Material.** R. E. C. De Pury, London.
451,291. **Ornamenting Rubber.** Bury Rubber Co., Ltd., London, and R. Horridge, Bury.
451,414. **Treating Leather.** British United Shoe Machinery Co., Ltd., Leicester. (Tanning Process Co., Boston, Mass., U. S. A.)
451,532. **Dyeing Elastic Fabrics.** Dognin Soc. Anon., Villeurbanne, France.

451,573. **Lined Article.** Wingfoot Corp., Wilmington, Del., U. S. A.
451,622. **Coated Fabric.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, and E. W. Madge and S. D. Taylor, both of Birmingham.

CHEMICAL

United States

2,065,371. **Carbon Black Aggregates.** H. J. Glaxner, Monroe, La., assignor to Columbian Carbon Co., New York, N. Y.
2,065,587. **Accelerator.** L. H. Howland, Nutley, N. J., assignor to United States Rubber Products, Inc., New York, N. Y.
2,065,937. **Rubber Compound.** G. S. Hiers, Cynwyd, assignor to Collins & Aikman Corp., Philadelphia, both in Pa.
2,066,002. **Protective Composition.** E. R. Hanson, Bloomfield, N. J., assignor to Halowax Corp., New York, N. Y.
2,066,274. **Improving Carbon Black.** W. H. Grote, Charleston, W. Va., assignor to United Carbon Co., Inc., a corporation of Md.
2,066,329, 2,066,330, and 2,066,331. **Chemical Product.** W. H. Carothers, A. M. Collins, and J. E. Kirby, assignors to E. I. du Pont de Nemours & Co., all of Wilmington, Del.
2,066,559. **Latex Treatment.** J. Edwardes, assignor to Heveatex Corp., both of Melrose, Mass.
2,067,299. **Rubber Solution.** I. Williams, Woodstown, and C. C. Smith, Carneys Point, both in N. J., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del.
2,067,304. **Artificial Rubber-like Mass.** E. Tschunkur and W. Bock, both of Cologne-Mulheim, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany.
2,067,465. **Synthetic Plastic.** W. P. ter Horst, Silver Lake, assignor to Wingfoot Corp., Akron, both in O.
2,067,494. **Accelerator.** J. G. Lichty, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,067,686. **Antioxidant.** W. L. Semon, Silver Lake Village, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,067,854. **Polymerized Haloprene Deodorization.** A. D. Macdonald, Malden, assignor to B. B. Chemical Co., Boston, both in Mass.
2,067,971. **Chlorinated Rubber.** F. P. Leach, Frodsham, and W. D. Spencer, Widnes, both in England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.
2,067,978. **Age Resister.** A. M. Neal, assignor to E. I. du Pont de Nemours & Co., both of Wilmington, Del.
2,068,355. **Accelerator.** R. L. Sibley, Nitro, W. Va., assignor, by mesne assignments, to Monsanto Chemical Co., St. Louis, Mo.

Dominion of Canada

362,888. **Water-Resisting Composition.** A. T. B. Kell, Beckenham, England.
363,242. **Adherent Grease.** Standard Oil Development Co., Linden, assignee of A. J. Morway, Roselle, and J. C. Zimmer, Hillside, co-inventors, all in N. J., U. S. A.
363,485. **Accelerator.** Canadian Industries, Ltd., Montreal, P. Q., assignee of I. Williams, Carneys Point, N. J., U. S. A.
363,486. **Rubber Plasticizer.** Canadian Industries, Ltd., Montreal, P. Q., assignee of I. Williams and C. C. Smith, co-inventors, both of Carneys Point, N. J., U. S. A.
363,487. **Plastic Rubber Product.** Canadian Industries, Ltd., Montreal, P. Q., assignee of I. Williams, Zeigler Tract, and C. C. Smith, Woodstown, co-inventors, both in N. J., U. S. A.
363,552. **Devulcanized Rubber Article.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of F. N. Pickett, London, England.

United Kingdom

451,000. **Accelerator.** Wingfoot Corp., Wilmington, Del., U. S. A.
451,006. **Accelerator.** W. W. and W. Cocker, both of Church.
451,023. **Rubber Composition.** J. H. Coffey, Rhos-on-Sea, North Wales.
451,236. **Abrasive Composition.** W. J. Tennant, London. (Carborundum Co., Niagara Falls, N. Y., U. S. A.)
451,340. **Age Resister.** S. Musher, New York, N. Y., U. S. A.
451,501. **Accelerator.** B. F. Goodrich Co., New York, N. Y., U. S. A., assignee of W. L. Semon.
451,595. **Rubber Condensation Product.** Wingfoot Corp., Wilmington, Del., U. S. A.
451,602. **Carbon Black.** Coutts & Co., London, and F. Johnson, Eastbourne, (representatives of J. Y. Johnson.) (I. G. Farbenindustrie A. G., Frankfurt a. M., Germany.)
451,782. **Rubber Composition.** E. I. du Pont de Nemours & Co., Wilmington, Del., U. S. A.

GENERAL

United States

20,220 (Reissue). **Spare Tire Cover.** G. A. Lyon, Allenhurst, assignor to Lyon, Inc., Asbury Park, both in N. J.
20,229 (Reissue). **Spindle.** F. G. Kraft, Richmond, Va., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Wilmington, Del.
2,064,848. **Bag Holder.** J. J. Neuman, S. Salem, N. Y.
2,064,852, 2,064,853, 2,064,854 and 2,064,855. **Vacuum Cleaner.** F. Riebel, Jr., and D. M. Dow, assignors to Air-Way Electric Appliance Corp., all of Toledo, O.
2,064,856. **Vacuum Cleaner.** F. Riebel, Jr., assignor to Air-Way Electric Appliance Corp., both of Toledo, O.
2,064,857. **Vacuum Cleaner.** F. Riebel, Jr., and D. M. Dow, assignors to Air-Way Electric Appliance Corp., all of Toledo, O.
2,064,879. **Liquid Carbonator and Dispenser.** W. Bösmann, Berlin, Germany.
2,064,890. **Track for Track Laying Vehicles.** J. A. Dorst, United States Army, San Francisco, Calif.
2,064,898. **Antiseptic Bandage.** E. Fetter, deceased, by F. Kemler, administratrix, assignor, by mesne assignments, to H. V. Lucas, all of Baltimore, Md.
2,064,900. **Pressure Applying Pad.** S. J. Finn, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.
2,064,943. **Golf Club.** W. F. Reach, Springfield, Mass., assignor to A. G. Spalding & Bros., New York, N. Y.
2,064,949. **Brush.** E. Rolker, Baltimore, Md.
2,064,959. **Shoe Bottom Pressure Applier.** W. D. Thomas, Lynn, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.
2,064,977. **Foundation Girdle.** L. Kahn, Brooklyn, N. Y.
2,065,120 and 2,065,121. **Inflatable Ball Valve.** W. W. De Laney, New Haven, and P. S. Madsen, Bethany, assignors to Seamless Rubber Co., Inc., New Haven, all in Conn.
2,065,134. **Rail Vehicle Wheel.** C. F. Hirshfeld, Detroit, Mich., assignor, by mesne assignments, to Transit Research Corp., New York, N. Y.
2,065,189. **Paper Finisher.** F. C. Ladd, Turners Falls, Mass.
2,065,191. **Ventilated Face Stay.** E. O. Loeber, Cleveland Heights, assignor to Cobel Co., Lakewood, both in O.
2,065,242. **Windshield Protector.** G. G. Omerly, Jr., Wyncote, Pa.
2,065,243. **Closure.** F. R. Perkins, Chicago, Ill.
2,065,327. **Window Bag and Wrapper Apparatus.** R. S. Grant and A. A. Schlegel, both of Akron, assignors to Jaite-Grant Display Bag Co., Cleveland, all in O.
2,065,402. **Refrigerator.** E. F. Schweller, Dayton, O., assignor, by mesne assignments, to General Motors Corp., a corporation of Del.
2,065,442. **Printer's Blanket.** A. L. Freedlander, assignor to Dayton Rubber Mfg. Co., both of Dayton, O.
2,065,450. **Carpet Padding.** P. Gordon, Venice, Calif.
2,065,501. **Eyecup and Bottle Closure.** A. Barol, assignor to John Wyeth & Bro., Inc., both of Philadelphia, Pa.
2,065,507. **Concrete Pile.** E. C. Alexander, Glen Ellyn, assignor to Massey Concrete Products Corp., Chicago, both in Ill.
2,065,521 and 2,065,522. **Expansion Joint.** A. C. Fischer, Chicago, Ill.
2,065,543. **Refrigerator.** H. F. Smith, Dayton, O., assignor, by mesne assignments, to General Motors Corp., a corporation of Del.
2,065,557. **Coffee Bean String Remover.** E. G. Berry, Indianapolis, Ind., assignor to B. F. Gump Co., Chicago, Ill.
2,065,584. **Brush.** A. Hempel, Berlin, Germany.
2,065,591. **Scrub Pail Drip Pan.** B. Kasik, Chicago, Ill.
2,065,613. **Shoe Press.** D. Russo, Boston, Mass.
2,065,696 and 2,065,697. **Tire Tread.** P. E. Hawkinson, Minneapolis, Minn.
2,065,856. **Sole and Heel.** L. Grover, Toronto, Ont., Canada.
2,065,881. **Coated Fabric.** A. M. Alvarado and H. J. Barrett, assignors to E. I. du Pont de Nemours & Co., all of Wilmington, Del.
2,065,936. **Wearing Apparel Band.** H. Hardie, assignor to Faultless Mfg. Co., both of Baltimore, Md.
2,065,941 and 2,065,942. **Grinding Wheel.** M. B. Lane, Holden, assignor to Norton Co., Worcester, both in Mass.
2,065,968. **Tire.** E. Goltstein, The Hague, Netherlands.
2,066,007. **Ink Bottle Stopper.** A. W. Keuffel, Montclair, N. J., and J. J. Lippoth, New York, N. Y., assignors to Keuffel & Esser Co., Hoboken, N. J.

2,066,031. **Printing Roller Adjuster.** P. W. Cowan, Los Angeles, Calif.
2,066,117. **Impregnated Article.** E. E. Mayfield, assignor to Hercules Powder Co., both of Wilmington, Del.
2,066,187. **Spring.** E. H. Piron, Highland Park, Mich., assignor, by mesne assignments, to Transit Research Corp., New York, N. Y.
2,066,218. **Adjustable Gun Butt.** W. J. Morgan, Youngstown, O.
2,066,242. **Conduit.** C. W. Abbott, Larchmont, N. Y., assignor to Bryant Electric Co., Bridgeport, Conn.
2,066,266. **V-Belt.** R. E. S. Geare, Philadelphia, assignor to L. H. Gilmer Co., Tacony, both in Pa.
2,066,270. **Machinery Packing.** C. R. Hubbard, assignor to Garlock Packing Co., both of Palmyra, N. Y.
2,066,324. **Garment.** O. A. Berman, Brooklyn, N. Y.
2,066,335. **Towel Rack Attachment.** C. S. Comstock, Great Barrington, Mass.
2,066,408. **Knitted Fabric.** V. Lombardi, Garden City, assignor to Lombardi Knitting Machine Co., Inc., New York, both in N. Y.
2,066,420. **Cleaner.** L. J. Reysa, Cedar Rapids, Iowa.
2,066,599. **Artificial Limb Ankle Joint.** S. A. Willett, Paducah, Ky., assignor of ½ to Birmingham Artificial Limb Co., Birmingham, Ala.
2,066,639. **Noncurl Flooring.** C. H. Masland, 2nd, Carlisle, Pa.
2,066,653. **Humidifier.** F. N. Smith, Grand Rapids, Mich.
2,066,662. **Stamp Vender and Advertiser.** C. M. Wheeler, St. Louis, Mo.
2,066,675. **Storage Battery.** C. J. Dunzweiler, assignor to Willard Storage Battery Co., both of Cleveland, O.
2,066,691. **Battery Terminal.** H. W. Lormor, Cleveland Heights, assignor to Willard Storage Battery Co., Cleveland, both in O.
2,066,725. **Life Buoy Belt.** J. Gammaitoni, assignor of ⅓ to J. Gammaitoni and ⅓ to N. Gammaitoni, all of Wilkes-Barre, Pa.
2,066,755. **Roll.** R. J. Wilkie, Newton, assignor to Stowe-Woodward, Inc., Newton Upper Falls, both in Mass.
2,066,773. **Drain and Flusher.** G. Felice, Detroit, Mich.
2,066,799. **Hoop Ball.** W. B. Reynolds, Richmond, Ind.
2,066,855. **Saddle Girth.** A. J. Robertson, Vancouver, B. C., Canada, assignor to S. Erhardt, doing business as the Whitman Saddle Mfg. Co.
2,067,039. **Retainer.** G. A. Auer, Chicago, Ill.
2,067,062. **Filament Drawer and Breaker.** J. G. Oswald, Woonsocket, R. I., assignor to Whitin Machine Works, Whitinsville, Mass.
2,067,074. **Freezing Tray.** R. H. Chilton, Dayton, O., assignor to General Motors Corp., Detroit, Mich.
2,067,109. **Elastic Coupling.** S. M. Viale and H. N. Wylie, assignors to Armstrong Siddeley Motors, Ltd., all of Coventry, England.
2,067,118. **Display Case Sliding Door.** H. E. Case, assignor to Luzerne Rubber Co., both of Trenton, N. J.
2,067,213. **Explosive.** W. O. Snelling, Allentown, Pa., assignor to Trojan Powder Co., a corporation of N. Y.
2,067,268. **Respiration Promoter.** H. Hans, Wiesbaden, Germany.
2,067,284, 2,067,285, and 2,067,286. **Flexible Joint.** J. W. B. Pearce, Toledo.
2,067,287. **Drive Shaft Arrangement.** J. W. B. Pearce, Toledo, O.
2,067,400. **Transmission Belt.** H. Koplin, New York, N. Y., and T. S. Watson, Milwaukee, Wis.
2,067,410. **Flexible Blade Fan.** E. Newnham, assignor to Knapp-Monarch Co., both of St. Louis, Mo.
2,067,433. **Plug Cap.** F. J. Boller, Mt. Vernon, N. Y., assignor, by mesne assignments, to Belden Mfg. Co., Chicago, Ill.
2,067,448. **Tire Retainer.** H. J. Horn, Lansing, Mich., assignor to Motor Wheel Corp., a corporation of Mich.
2,067,486. **Hosiery.** G. Gastrich, assignor to Textile Machine Works, both of Wyomissing, Pa.
2,067,490. **Tire Pressure Indicator.** W. L. Jones, St. Louis, Mo.
2,067,545. **Tire.** J. B. Ricketts, Jr., Lomita Park, San Bruno, Calif.
2,067,647. **Belt.** J. T. Potts, Salt Lake City, Utah, assignor to Hewitt Rubber Corp., Buffalo, N. Y.
2,067,751. **Tool Handle Securer.** R. E. Beegle, E. St. Louis, Ill.
2,067,788. **Tire.** C. Putnam, Norristown, Pa.
2,067,882. **Tire Inflator.** J. H. Alessi, assignor, by direct and mesne assignments, to G. S. Postma, both of Denver, Colo.
2,067,909. **Hair Remover.** E. Fetter; F. A. Kemler, executrix of said E. Fetter, deceased, assignor, by mesne assignments, to H. V. Lucas, all of Baltimore, Md.
2,068,035. **Packing Strip.** E. Meyer, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,068,050. **Antiskid Tire.** H. Z. Bishop, Lyons, N. Y.
2,068,061. **Anti-vibration Belt.** R. D. May, assignor of ⅓ to Vancouver Liberty Investment Co., and ⅓ to E. G. Parsons, all of Vancouver, Wash.
2,068,134. **Inflatable Air Mattress.** W. H. Houghton, Orpington, England.
2,068,158. **Flushing Valve.** P. H. Theisen, San Francisco, Calif.
2,068,182. **Hand Covering.** F. S. Jackson, Washington, O.
2,068,186. **Garment.** J. H. Le Coney, Bedford, assignor to Earnshaw Knitting Co., Newton, both in Mass.
2,068,211. **Fly Swatter.** J. G. Wasson, assignor to Gatch Brush & Wire Goods Co., both of Baltimore, Md.
2,068,238. **Overshoe.** H. Malm, New York, N. Y.
2,068,266. **Tire Valve.** A. Engel, New York, assignor to A. Schrader's Son, Inc., Brooklyn, both in N. Y.
2,068,267. **Storage Battery Separator.** T. B. Entz, New Rochelle, N. Y.
2,068,279. **Elastic Spring.** E. H. Piron, assignor, by mesne assignments, to Transit Research Corp., both of New York, N. Y.
2,068,281. **Shower Cap.** M. Stone, New York, N. Y.
2,068,366. **Hair Waver.** W. H. Bleuel, Dormont, Pa., and S. Steek, Steubenville, O.
2,068,419. **Fountain Pen.** G. Larsen, Springfield, N. J., assignor to L. E. Waterman Co., New York, N. Y.
2,068,456. **Elastic Ventilated Fabric.** E. J. Hooper, Nutley, N. J.
2,068,474. **Handle Bar.** F. W. Schwinn, Chicago, Ill.
2,068,486. **Electrical Connecter.** C. E. Gilbert, New York, N. Y.
2,068,487. **Pencil and Eraser Holder.** E. M. Gorrell, Columbus, O.
2,068,493. **Corset.** J. J. Kispert, Hamden, assignor to I. Newman & Sons, Inc., New Haven, both in Conn.

Dominion of Canada

362,755. **Cylinder Packing.** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of P. W. Dempsey, Pittsburgh, Pa., U. S. A.
362,778. **Tire Cover.** Lyon, Inc., assignee of G. A. Lyon, both of Detroit, Mich., U. S. A.
362,837. **Flyer.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of F. D. Chittenden, Providence, and K. J. Rupprecht, Barrington, co-inventors, both in R. I., U. S. A.
362,866. **Resilient Wheel.** M. A. P., J., and I. G. Ravestein, heirs-at-law of the estate of W. Ravestein, deceased, all of Monster, South Holland, the Netherlands.
362,900. **Anti-squeak Strip.** R. W. Springer, Detroit, Mich., U. S. A.
362,979. **Acid Container Lining.** B. F. Goodrich Co., New York, N. Y., assignee of W. T. Haines, Stow, O., both in the U. S. A.
363,027. **Tire.** Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., assignee of C. G. Hoover, Akron, O., U. S. A.
363,035. **Grinding Disk.** Norton Co., assignee of T. L. F. Larsson, both of Worcester, Mass, U. S. A.
363,038. **Grinding Wheel.** Norton Co., assignee of A. O. Bush and R. H. Martin, co-inventors, all of Worcester, Mass., U. S. A.
363,048. **Composite Garment.** Vogue Mfg. Co., Newark, assignee of J. V. Hollar, E. Orange, both in N. J., U. S. A.
363,072. **Shoe.** R. Leullier, Ste.-Marie Beauce, P. Q.
363,107. **Door Bumper.** M. Kahn, Chicago, Ill., U. S. A.
363,108. **Endless Track.** A. Kegresse, Paris, France.
363,113. **Typewriter Platen.** W. E. Taylor, Londonderry, Northern Ireland.
363,296. **Brush or Broom.** K. Wachtarz, Berlin, Germany.
363,300. **Cushioned Seat.** I., A., and H. Singer, co-inventors, all of Montreal, P. Q.
363,325. **Separator.** Andale Co., Philadelphia, assignee of D. R. McNeal, Abington, both in Pa., U. S. A.
363,439. **Anklet.** G. H. Jung, Jr., Cincinnati, O., U. S. A.
363,453, 363,454, 363,455, and 363,456. **Engine Mounting.** R. S. Trott, Denver, Colo., U. S. A.
363,457. **Exhaust Line Mounting.** R. S. Trott, Denver, Colo., U. S. A.
363,458. **Flexible Tubing.** F. V. Brostrom, Kingston-on-Thames, England.
363,472 **Finger Stall Toothbrush.** R. G. Stevens, Chicago, Ill., U. S. A.
363,498. **Pipe.** Dominion Rubber Co., Ltd., assignee of J. A. Porteous, both of Montreal, P. Q.
363,499. **Valve.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. Eger, Grosse Pointe Park, Mich., U. S. A.
363,549. **Elastic Yarn.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of B. H. Foster, Maplewood, N. J., U. S. A.
363,550. **Elastic Yarn.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of F. D. Chittenden, Providence, R. I., U. S. A.
363,551. **Tire Tube.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. Eger, Grosse Pointe Park, Mich., U. S. A.

363,578, 363,579, and 363,580. **Rubber Insulation.** Simplex Wire & Cable Co., Boston, assignee of C. R. Boggs, Waban, both in Mass., U. S. A.
363,585. **Waterproof Insulating Material.** Union Asbestos & Rubber Co., assignee of W. R. Gillies, both of Chicago, Ill., U. S. A.
363,612. **Pipe Joint Seal.** P. D. Merrill, S. Bend, Ind., U. S. A.
363,622. **Toy Gasoline Pump.** J. H. Wagner, Toronto, Ont.

United Kingdom

451,001. **Electrolytic Etcher.** British Insulated Cables, Ltd., Prescot, S. D. Syndicate, Ltd., London, E. G. Hartel, Wembley Park, F. J. Brislee, Huyton, and R. Blackburn, Prescot.
451,015. **Bottle Closure.** C. J. Carlsson and E. G. Gustafsson, both of Filipstad, Sweden.
451,022. **Resilient Mounting.** H. C. Lord, Erie, Pa., U. S. A.
451,041. **Tire Leak Indicator.** A. A. Michieli, Stanmore.
451,044. **Vehicle Spring Suspension.** C. Macbeth, Birmingham.
451,059. **Reservoir Marker.** Lunzer Mfg. Co., Ltd., and S. Lunzer, both of London.
451,063. **Golf Club.** A. G. Spalding & Bros. (British), Ltd., London. (J. V. East, Long Meadow, Mass., U. S. A.)
451,073. **Yielding Bearing Support.** H. Rohn, Thuringia, Germany.
451,074. **Insecticide Mixer.** J. A. Sambrook, Penmaenmawr, Wales.
451,107. **Stocking Ironer.** F. Schuster, Chemnitz, Germany.
451,119. **Pipe Joint.** N. Swindin and Nordac, Ltd., both of Harrow.
451,136. **Squeegee.** Dunlop Rubber Co., Ltd., London, and H. Willshaw, Birmingham.
451,174. **Coffee Berry Pulper.** R. E. Burgess, London. (B. M. Playford, Kyambu, Kenya Colony, East Africa.)
451,210. **Oversock.** C. J. Lord, Kingstown, Irish Free State.
451,228. **Siphon Bottle.** A. C. Sayers, Ilford.
451,275. **Fountain Pen.** E. S. Sears, Oxhey, and Mabie, Todd & Co., Ltd., London.
451,285. **Mattress.** H. Heal, J. Russell, and Staples & Co., Ltd., all of London.
451,331. **Driving Belt.** United States Rubber Products, Inc., New York, N. Y., U. S. A.
451,376. **Ball.** Crawford, McGregor & Canby Co., Dayton, O., U. S. A.
451,378. **Tractor Wheel.** H. A. Dixon, Great Ayton.
451,392. **Mudguard.** H. Panzetta, Watford.
451,403. **Cooling Slab.** British Automatic Refrigerators, Ltd., Westminster, and C. E. Garrod, Rotherham.
451,408. **Ball.** J. H. J. Sengers and M. Post, both of Delft, Holland.
451,455. **Handle.** N. R. Stiles, Billingshurst.
451,458. **Floating Toy.** R. P. F. Ferber, Paris, France.
451,465. **Milk Bottle Cap.** J. R. Gammeter, Akron, O., U. S. A.
451,490. **Vehicle Spring Suspension.** Dr. Ing. h.c.F. Porsche Ges., Stuttgart, Germany.
451,536. **Cleaning Pad.** J. S. Tsipis, London.
451,541. **Pipe Coupling.** K. L. Lanninger, Frankfurt a. M., Germany.
451,550. **Insole.** E. Lee & Sons, Ltd., and A. Lee, both of St. Albans.
451,566. **Two-part Coupling.** United States Rubber Co., New York, N. Y., U. S. A.
451,577. **Aircraft Engine Support.** J. F. Paulsen, Viroflay, and N. Strachovsky, Paris, both in France.
451,588. **Inflatable Ball.** J. Bowman, London.
451,593. **Sponge.** H. W. Webb, Southampton.
451,606. **Heel.** J. Coggans, Glasgow, Scotland.
451,608. **Sole.** M. A. Noble, H. Rubinstein, and F. H. Gee (trading as Newmatik Footwear Co.), all of Sydney, Australia.
451,628. **Battery Separator.** Compagnie Generale D'Electricite, Paris, France.
451,686. **Carton.** A. O. Daller, New York, N. Y., U. S. A.
451,698. **Paper Tube.** Berliner Maschinenbau - Akt. - Ges. Vorm. L. Schwartzkopff, Berlin, Germany.
451,700. **Tread.** S. N. Macmillen, Radford, and Metal Mouldings, Ltd., London.
451,704. **Floor Cleaner.** F. W. Taylor, London.
451,707. **Reservoir Pad.** J. Mellor, Salford.
451,741. **Saddle.** K. Wagner (trading as Kaufmann & Co. Handel Mit Automobilbestandteilen), Vienna, Austria.
451,759. **Vehicle Spring Suspension.** Dr. Ing. h.c.F. Porsche Ges., Stuttgart, Germany.
451,776. **Motor Insulation.** M. Surjaninoff, Stammersdorf, Austria.
451,781. **Grinding Wheel.** Carborundum Co., Niagara Falls, N. Y., U. S. A.
451,803. **Matting.** C. J. Pomeroy, Inchinnan, Scotland.
451,806. **Mudguard.** W. H. Parker and W. J. Yapp, both of Rainham.
451,839 and 451,840. **Bottle Filter Cap.** H. E. Chapman, Pinner.
451,871. **Vehicle Coupling.** K. H. Pratt, Northallerton.
451,883. **Vehicle Bumper.** Wilmot-Breeden, Ltd., and C. H. Stephenson, both of Birmingham.
451,892. **Railway Vehicle Bogie.** E. G. Budd Mfg. Co., Philadelphia, Pa., U. S. A., assignee of W. B. Dean.
451,896. **Wearing Apparel.** A. Bondo, London.
451,912. **Gas Mask.** R. P. Howes, Barnet.
451,924. **Motor Drive.** British Thomson-Houston Co., Ltd., London.
451,947. **Cushion.** H. H. Burton and John Bull Rubber Co., Ltd., both of Leicester.
451,950. **Driller.** S. Cutler, Westminster.
451,952. **Air-tight Tin.** M. D. Thompson, Surrey, (representative of S. M. Thompson).
451,976. **Truss.** E. W. Whaley, Batley.
451,985. **Electrolysis.** Naamlooze Vennootschap Industrieele Maatschappij Voorheeen Noury & Van Der Lande, Deventer, Holland.

Germany

640,453. **Elastic Woven and Knit Goods and Rubber Thread.** Firma Baumgarten, Wuppertal-Barmen.
640,922. **Inflatable Goods.** W. Plaat, Koln-Nippes.
641,103. **Hose with Cellulose Covering.** Kalle & Co., A.G., Wiesbaden-Biebrich.
641,262. **Impregnating Fiber with Latex.** J. E. C. Bongrand, Paris, France. Represented by G. Breitung and H. Marsch, both of Berlin.
641,318. **Articles of Microporous and Non-Porus Hard or Soft Rubber.** Kaysam Syndicate, Ltd., London, England. Represented by G. Lotterhos, Frankfurt a.M.
641,345. **House Shoes.** J. Kumme, Hartenstein, Erzgeb.

TRADE MARKS

United States

340,819. **Wee-Hug, Girdle of Grace.** Corsets and girdles. M. Dorfman, doing business as Real Form Girdle Co., Brooklyn, N. Y.
340,821. **X-ilator.** Massage pads. Drackett Co., Cincinnati, O.
340,835. **Filatex.** Elastic fabrics. Filatex Corp., New York, N. Y.
340,836. **Filatex.** Elastic yarn. Filatex Corp., New York, N. Y.
340,853. **Doris Marie.** Hose supporters and garters. W. T. Grant Co., New York, N. Y.
340,873. **Kempat.** Corsets, brassieres, diaphragm supports, suspender belts, and stocking suspenders. Kempat Ltd., London, England.
340,881. **Cocktail Hour.** Girdles. Sid Levy & Sons, San Francisco, Calif.
340,882. **Up-N-Up.** Foundation garments. Lewel Mfg. Co., Inc., New York, N. Y.
340,929. Circle containing representation of a blue bird and the words: **"Blue Bird."** Shuttlecocks. Pennsylvania Rubber Co. of America, Inc., Jeannette, Pa.
340,930. Circle containing representation of a red bird and the words: **"Red Bird."** Shuttlecocks. Pennsylvania Rubber Co. of America, Inc., Jeannette, Pa.
340,952. **"F(l)at Fannies."** Corsets and foundation garments. Royal Worcester Corset Co., Worcester, Mass.
340,961. The word: **"Shefley"** in an oval design. Footwear. H. Scheft Co., Boston, Mass.
341,018. Representation of the bottom of a foot, containing the words: **"Indian Moc."** Footwear. Foot Form Shoe Shops, Inc., New York, N. Y.
341,042. **Vispronal.** Synthetic polymerization products. Advance Solvents & Chemical Corp., New York, N. Y.
341,072. **Lightway.** Heels and soles. Bradstone Rubber Co., Woodbine, N. J.
341,150. **Drysteps.** Overshoes. Gimbel Bros., Inc., New York, N. Y.
341,157. **Doris Marie.** Shoulder straps and dress shields. W. T. Grant Co., New York, N. Y.
341,177. **Jewels.** Prophylactic rubber articles. J. Jacobs, New York, N. Y.
341,228. Representation of a star and irradiating beams with the words: **"Le Mars."** Prophylactic rubber articles. J. Perrotta, doing business as Per-Zadi Products Co., New York, N. Y.
341,270. **"Per-Fit."** Brassieres, girdles, foundation garments, etc. A. Stein & Co., Chicago, Ill.
341,308. **Kling-Tite.** Prophylactic skin articles. Youngs Rubber Corp., Inc., New York, N. Y.
341,326. Circle containing the words: **"Amco Selective Service."** Brake lining sets. Asbestos Mfg. Co., Huntington, Ind.
341,394. Oval containing two connected circles and the words: **"Su-**

(Continued on page 82)

PUBLICATIONS

(*Continued from page 66*)

"Imports (for consumption) into the United States by Countries of Selected Commodities for Calender Years 1931-1935 Inclusive." United States Tariff Commission, Washington, D. C. This tabulated bulletin of statistics includes 31 pages covering latex, various crude rubbers, reclaimed rubber, rubber scrap, practically all types of manufactured soft rubber products, hard rubber, gutta percha products, and rubber substitutes; 11 pages of appendices covering waterproof cloth, leather footwear, fiber and rubber belts, rubber toys, golf and tennis balls. The figures show total quantity and value for each entire year. Except where otherwise indicated, the value of imports is the foreign wholesale value converted to United States currency at the rate of exchange prevailing at the time of shipment, and weights shown in the tables represent net weights of merchandise exclusive of containers. This is the first time that figures for the earlier years have been made available showing imports for consumption—both entries for immediate consumption and withdrawals from bonded warehouses for consumption—by countries from which imported. Heretofore, statistics have included all entries whether for immediate consumption, warehousing or re-export.

"Alcohol for Industrial Purposes." U. S. Industrial Alcohol Co., 60 E. 42nd St., New York, N. Y. This 40-page booklet is a comprehensive review of the laws and regulations, composition, authorized uses, and commercial data covering completely denatured alcohol, specially denatured alcohol, and pure ethyl alcohol, tax paid and tax free. This very complete information is well selected, clearly indexed, and concisely presented for ready reference.

"Micromax Recorder." Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa. Die-Out N D (1), with eight pages, cut to the actual shape of the Silver-Anniversary Micromax Recorder, shows in perspective at approximately half size the mechanism, chart, and record in color. This die-out describes the internal works and enumerates many of the uses to which the instrument can be applied as a measuring and recording device.

"Utanol in the Rubber Industry." Woburn Degreasing Co. of New Jersey, Harrison, N. J. This six-page bulletin, No. 109, discusses the use and benefits of Utanol as a softener and scorch reducer in connection with reclaiming tubes and whole tires as well as the milling of compounded rubber stocks; as an aid to smoothness and greater production when working and extruding compounded rubber stocks; and as a softener for Neoprene and "Thiokol."

(*Concluded on page 78*)

RUBBER BIBLIOGRAPHY

SPECIFIC PROPERTIES OF ARTIFICIAL (BUNA) RUBBER. A. Koch, *Rubber Chem. Tech.*, Jan., 1937, pp. 17-28.

HARDNESS OF VULCANIZED RUBBER AT LOW TEMPERATURES. H. Nagai, *Rubber Chem. Tech.*, Jan., 1937, pp. 55-63.

SWELLING CAPACITY OF RUBBER IN MIXTURES OF SOLVENTS IN RELATION TO THEIR DIELECTRIC POLARIZATIONS. N. Ermolenko and S. Levina, *Rubber Chem. Tech.*, Jan., 1937, pp. 105-13.

VARIOUS OZONIDES OF RUBBER AND THE GENERAL QUESTION OF THE EXISTENCE OF PRIMARY OZONIDES. R. Pummerer, *Rubber Chem. Tech.*, Jan., 1937, pp. 114-19.

INFRARED ABSORPTION OF RUBBER AND RELATED HYDROCARBONS. D. Williams, *Rubber Chem. Tech.*, Jan., 1937, p. 120.

ROENTGENOGRAPHIC INVESTIGATIONS OF STRETCHED VULCANIZED RUBBER. M. Iguchi and F. Schossberger, *Rubber Chem. Tech.*, Jan., 1937, pp. 121-25.

STRUCTURE OF SYNTHETIC TYPES OF RUBBER. Polychloroprenes. A. L. Klebanskii and V. G. Vasil'eva, *Rubber Chem. Tech.*, Jan., 1937, pp. 126-34.

AMPHOROUS AND CRYSTALLINE FORMS OF RUBBER HYDROCARBON. G. S. Parks, *Rubber Chem. Tech.*, Jan., 1937, pp. 135-36.

GUTTA-PERCHA. Effect of Vulcanization on Its X-Ray Diagram. C. S. Fuller, *Rubber Chem. Tech.*, Jan., 1937, pp. 137-49.

NATURAL AND SYNTHETIC RUBBER. xvi. The Structure of Polystyrene. T. Midgley, Jr., A. L. Henne, and H. M. Leicester, *Rubber Chem. Tech.*, Jan., 1937, pp. 150-52.

REPORT OF THE WORK OF THE CEYLON RUBBER RESEARCH BOARD IN 1935. 96 pages, Colombo, Government Record Office, 1936.

ANNUAL REPORT OF THE RUBBER RESEARCH INSTITUTE OF MALAYA FOR 1935. 163 pages, Kuala Lumpur, Rubber Research Institute of Malaya, 1936.

TIRE PRODUCTION AND CONSUMPTION. *Rubber Age (London)*, Jan., 1937, pp. 361-62.

NEW MARKETS TO CONQUER. D. D. McLachlan, *India Rubber J.*, Jan. 30, 1937, pp. 147, 150-53.

HEVEA BRASILIENSIS AS A PRODUCER OF RUBBER. G. van Iterson, Jr., *India Rubber J.*, Jan. 2, 1937, pp. 23-30.

RUBBER PLANTING AS A PROFESSION. *Rubber Age (London)*, Feb., 1937, pp. 402-403.

SAFE USE OF SOLVENTS. R. S. Farnum, *Rubber Age (London)*, Feb., 1937, pp. 405-407.

DEMOCRATS, TECHNOCRATS, AND TIRES. G. F. Powell, *Rubber Age (London)*, Feb., 1937, pp. 408-410.

THE RUBBER INDUSTRY AND THE PLASTICS INDUSTRY. H. Barron, *India Rubber J.*, Jan. 16, 1937, pp. 89-96, 102.

RUBBER PRODUCTION COSTS. *Bull. Rubber Growers' Assocn.*, Dec., 1936, pp. 539-44.

TWENTY-EIGHTH REPORT ON NATIVE RUBBER CULTIVATION. *Bull. Rubber Growers' Assocn.*, Dec., 1936, pp. 545-55.

PHYSICAL PROPERTIES OF RAW RUBBER. *Can. Chem. Met.*, Jan., 1937, p. 13.

1886-1936: DEVELOPMENT OF THE RUBBER INDUSTRY AS REFLECTED IN THE *Gummi-Zeitung*. *Gummi-Ztg.*, Jan. 1, 1937, pp. 11-12; Jan. 29, pp. 101-102.

ABOUT SYNTHETIC RUBBER (BUNA). E. Konrad, *Kautschuk*, Jan., 1937, pp. 1-6.

MANUFACTURE OF DRIVING AND CONVEYER BELTS FROM RUBBERIZED FABRIC. W. Esch, *Kautschuk*, Jan., 1937, pp. 7-10.

MEASURING TEMPERATURE ON REVOLVING ROLLS. S. Wintergerst, *Kautschuk*, Jan., 1937, pp. 10-11.

MACHINES FOR THE MANUFACTURE OF CABLES. *Kautschuk*, Jan., 1937, pp. 11-14. (To be continued.)

USE OF ACETYLENE IN THE RUBBER INDUSTRY. P. Walter, *Caoutchouc & gutta-percha*, Jan. 15, 1937, pp. 3-5. (Conclusion.)

BALATA. L. Morisse, *Rev. gén. caoutchouc*, Nov., 1936, pp. 3-9. (To be continued.)

BIOCHEMISTRY OF HEVEA LATEX. M. Oliviero, *Rev. gén. caoutchouc*, Nov., 1936, p. 10.

TESTING FABRICS USED IN THE RUBBER INDUSTRY. P. Bourgois, *Rev. gén. caoutchouc*, Nov., 1936, pp. 11-13.

MODE OF ACTION OF DISULPHIDE ACCELERATORS OF VULCANIZATION. W. Langenbeck and H. C. Rhiem, *Rubber Chem. Tech.*, Jan., 1937, pp. 158-63.

STUDIES ON THE ARTIFICIAL AGING OF VULCANIZED RUBBER. I. Depolymerization during the Heat-Aging. II. The Relation between Aging and Temperature. III. Aging in Nitrogen Gas. H. Nagai, *Rubber Chem. Tech.*, Jan., 1937, pp. 164-79.

RUBBER LATEX FOR ROAD SURFACING. W. G. Wren and A. T. Faircloth, *Rubber Chem. Tech.*, Jan., 1937, pp. 199-202.

SWELLING AND SOLVATION OF RUBBER IN DIFFERENT SOLVENTS. I. Williams, *Ind. Eng. Chem.*, Feb., 1937, pp. 172-74.

LATEX BATTERY SEPARATORS. Preparation and Properties. H. W. Greenup and L. E. Olcott, *Ind. Eng. Chem.*, Feb., 1937, pp. 192-94.

VULCANIZATION CHARACTERISTICS OF MERCAPTOBENZOTHIAZOLE DERIVATIVES. M. W. Harman, *Ind. Eng. Chem.*, Feb., 1937, pp. 205-207.

CHEMISTRY OF SOFT RUBBER VULCANIZATION. V. Treatment of Dilute Rubber Cements with Sulphur Chloride. B. S. Garvey, Jr., *Ind. Eng. Chem.*, Feb., 1937, pp. 208-12.

RUBBER IN AVIATION. G. Mason, *Rubber Age (N. Y.)*, Feb., 1937, pp. 283-84.

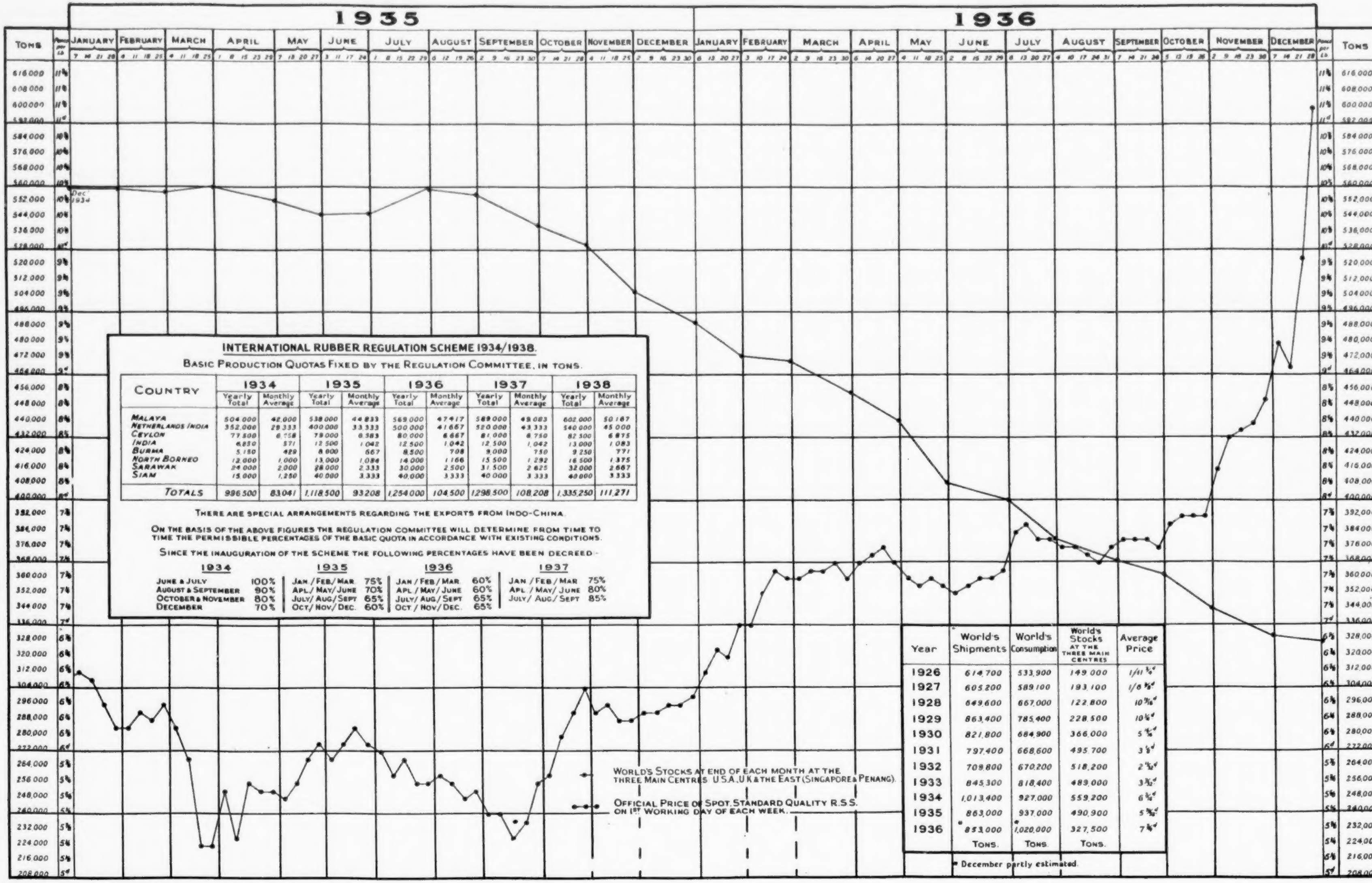
IMPROVEMENTS IN RUBBER INSULATING COMPOUNDS. S. J. Rosch, *Rubber Age (N. Y.)*, Feb., 1937, pp. 285-88.

USE OF STILLS IN RECOVERING RUBBER SOLVENTS. A. White, *Rubber Age (N. Y.)*, Feb., 1937, pp. 289-91.

MODERN FACTORY PRACTICE. H. C. Young, *India Rubber J.*, Feb. 6, 1937, pp. 11-14.

STEELS AND MATERIALS FOR THE RUBBER INDUSTRY. *India Rubber J.*, Feb. 13, 1937, pp. 6-7.

Rubber Prices and Stocks



INTERNATIONAL RUBBER REGULATION SCHEME 1934/1938.

BASIC PRODUCTION QUOTAS FIXED BY THE REGULATION COMMITTEE, IN TONS.

Country	1934		1935		1936		1937		1938	
	Yearly Total	Monthly Average	Yearly Total	Monthly Average	Yearly Total	Monthly Average	Yearly Total	Monthly Average	Yearly Total	Monthly Average
Malaya	504,000	42,000	538,000	44,833	569,000	47,417	589,000	49,083	602,000	50,167
Netherlands India	352,000	29,333	400,000	33,333	500,000	41,667	520,000	43,333	540,000	45,000
Ceylon	77,500	6,458	79,000	6,583	80,000	6,667	81,000	6,750	82,500	6,875
India	6,850	571	12,500	1,042	12,500	1,042	12,500	1,042	13,000	1,083
Burma	5,150	429	8,000	667	8,500	708	9,000	750	9,250	771
North Borneo	12,000	1,000	13,000	1,084	14,000	1,166	15,500	1,292	16,500	1,375
Sarawak	24,000	2,000	28,000	2,333	30,000	2,500	31,500	2,625	32,000	2,667
Siam	15,000	1,250	40,000	3,333	40,000	3,333	40,000	3,333	40,000	3,333
Totals	996,500	83,041	1,118,500	93,208	1,254,000	104,500	1,298,500	108,208	1,335,250	111,271

THERE ARE SPECIAL ARRANGEMENTS REGARDING THE EXPORTS FROM INDO-CHINA.

ON THE BASIS OF THE ABOVE FIGURES THE REGULATION COMMITTEE WILL DETERMINE FROM TIME TO TIME THE PERMISSIBLE PERCENTAGES OF THE BASIC QUOTA IN ACCORDANCE WITH EXISTING CONDITIONS.

SINCE THE INAUGURATION OF THE SCHEME THE FOLLOWING PERCENTAGES HAVE BEEN DECREED:-

1934		1935		1936		1937	
June & July	100%	Jan./Feb./Mar.	75%	Jan./Feb./Mar.	60%	Jan./Feb./Mar.	75%
August & September	90%	Apl./May/June	70%	Apl./May/June	60%	Apl./May/June	80%
October & November	80%	July/Aug./Sept.	65%	July/Aug./Sept.	65%	July/Aug./Sept.	85%
December	70%	Oct./Nov./Dec.	60%	Oct./Nov./Dec.	65%		

Year	World's Shipments	World's Consumption	World's Stocks at the Three Main Centres	Average Price
1926	614,700	533,900	149,000	1/11 3/4d
1927	605,200	589,100	193,100	1/6 3/8d
1928	649,600	667,000	122,800	10 13/16d
1929	863,400	785,400	228,500	10 1/4d
1930	821,800	684,900	366,000	5 15/16d
1931	797,400	668,600	495,700	3 1/8d
1932	709,800	670,200	518,200	2 11/32d
1933	845,300	818,400	489,000	3 13/32d
1934	1,013,400	927,000	559,200	6 5/16d
1935	863,000	937,000	490,900	5 29/32d
1936	*853,000	*1,020,000	327,500	7 3/4d
	Tons.	Tons.	Tons.	

* December partly estimated.

Hecht, Levis & Kahn, Ltd.

Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES

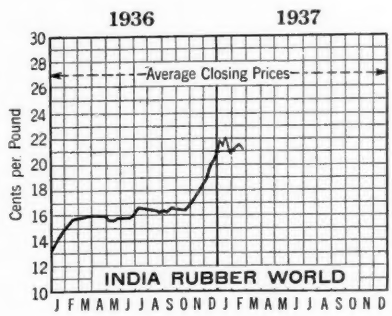
Futures	Dec. 26	Jan. 30	Feb. 6	Feb. 13	Feb. 20
Jan.	21.62	.....	.....	.....	.....
Feb.	.....	21.01	21.47	21.52	20.94
Mar.	21.67	21.06	21.50	21.55	20.96
July	21.30	21.00	21.50	21.65	21.18
Sept.	21.22	20.95	21.46	21.65	21.21
Dec.	.....	20.90	21.42	21.65	21.21
Jan.	.....	.....	21.42	21.65	21.21
Volume per week (tons)	11,900	12,630	8,590	9,710	15,300

New York Quotations

New York outside market rubber quotations in cents per pound

Paras	Feb. 26, 1936	Jan. 27, 1937	Feb. 25, 1937
Upriver fine	16½	22¾	21
Upriver fine	*19	*28½	*27¼
Upriver coarse	12½	15	14
Upriver coarse	*15½	*21½	*20¾
Islands fine	17	22½	20½
Islands fine	*19	*28	*26
Acre, Bolivian fine	16½	23¼	21¼
Acre, Bolivian fine	*19	*28½	*27½
Beni, Bolivian	17	23½	22
Madeira fine	16½	22¾	21¼
Caucho			
Upper ball	12½	15	14
Upper ball	*15½	*21½	*20¾
Lower ball	12	14	13½
Pontianak			
Bandjermasin	6½	7	6
Pressed block	12½	12/22	11/27
Sarawak	6½	7	6
Guayule			
Duro, washed and dried	12½	16	16
Ampar	13½	16½	17½
Africans			
Rio Nuñez	15½	18	23
Black Kassai	15½	18	23
Prime Niger flake	25	29	29
Gutta Percha			
Gutta Siak	11¾	10½	10¾
Gutta Soh	12¾	14	14
Red Macassar	1.20	1.00	1.05
Balata			
Block, Ciudad Bolivar	28	30	32
Manaos block	28	26	25
Surinam sheets	37	35	33
Amber	39	39	38

*Washed and dried crepe. Shipments from Brazil.



New York Outside Market—Spot Ribbed Smoked Sheets

THE Commodity Exchange table shows prices of representative future contracts on the New York market during the past two months.

During February the market trading was steady with the prices holding approximately the same as during the latter part of January, that is in the neighborhood of 21¢; February high being 21.65¢ per pound.

The 1937 permissible exports for first quarter at 75%, second quarter at 80%, and third quarter at 85%, with flexibility between quarters at least from a control standpoint has implied temporary elimination of restriction and has passed to the exporter the responsibility for an adequate supply. While there is great doubt as to their ability to approach these quotas, it undoubtedly has produced a sobering effect on the buyers.

New York Outside Market

Factory buying interest was of only fair proportions during February when No. 1 ribbed smoked sheets ranged between 20 13/16¢ and 21 9/16¢ per pound. Buying was very steady throughout the month. The effect of the automobile strike has been very little as most tire factories continued steady production as it gave them an opportunity to catch up on stock to some extent.

The week-end closing prices on No. 1 ribbed smoked sheets follow: January 30, 21 1/16¢; February 6, 21½¢; February 13, 21 9/16¢; February 20, 21¢.

RUBBER SCRAP

THE demand for all grades of rubber scrap is active and keeps a close pace with the amount of scrap being collected. While the supply appears sufficient to fill orders, there is no tendency to build up a stock. Since January 27 prices have remained stable. Mixed auto tires with beads and beadless and clean mixed solid truck tires fell off $1 a ton. Number 1 and 2 red mechanical scrap advanced very slightly in price. Other items remained the same as on January 27.

CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)

February 25, 1937

Boots and Shoes		Prices
Boots and shoes, black	lb.	$0.01¼/$0.01⅜
Colored	lb.	.00⅞/ .01
Untrimmed arctics	lb.	.00⅞/ .01
Inner Tubes		
No. 1, floating	lb.	.12½/ .13½
No. 2, compound	lb.	.05⅜/ .05¾
Red	lb.	.05½/ .05⅞
Mixed tubes	lb.	.05¼/ .05⅝
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	ton	12.50 /13.50
Beadless	ton	17.75 /18.75
Auto tire carcass	ton	24.00 /26.00
Black auto peelings	ton	18.75 /19.75
Solid		
Clean mixed truck	ton	31.00 /32.00
Light gravity	ton	36.00 /37.00
Mechanicals		
Mixed black scrap	ton	25.00 /30.00
Hose, air brake	ton	31.00 /33.00
Garden, rubber covered	ton	16.50 /18.00
Steam and water, soft	ton	16.50 /18.00
No. 1 red	lb.	.03¾/ .04
No. 2 red	lb.	.03 / .03¼
White druggists' sundries	lb.	04½/ .05
Mechanical	lb.	.04¼/ .04¾
Hard Rubber		
No. 1 hard rubber	lb.	.14½/ .15½

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	Jan. 25, 1937	26	27	28	29	30	Feb. 1, 1937	2	3	4	5	6
No. 1 Ribbed Smoked Sheet	21⅛	21⅜	21	21⅛	21⅛	21 1/16	21	21	21⅛	21¼	21 7/16	21½
No. 2 Ribbed Smoked Sheet	21 1/16	21 5/16	20 15/16	21 1/16	21 1/16	21	20 15/16	20 15/16	21 1/16	21 3/16	21⅜	21 7/16
No. 3 Ribbed Smoked Sheet	21 1/16	21 5/16	20 15/16	21 1/16	21 1/16	21	20 15/16	20 15/16	21 1/16	21 3/16	21⅜	21 7/16
No. 4 Ribbed Smoked Sheet	21	21¼	20⅞	21	21	20 15/16	20⅞	20⅞	21	21⅛	21 5/16	21⅜
No. 1 Thin Latex Crepe	22¼	22½	22⅛	22¼	22¼	22 3/16	22⅛	22⅛	22¾	23	23⅛	23⅛
No. 1 Thick Latex Crepe	22¼	22½	22⅛	22¼	22¼	22 3/16	22⅛	22⅛	22¾	23	23⅛	23⅛
No. 1 Brown Crepe	21 1/16	21 5/16	20 15/16	21 1/16	21 1/16	21	20 15/16	20 15/16	21 1/16	21 3/16	21⅜	21 7/16
No. 2 Brown Crepe	21	21¼	20⅞	21	21	20 15/16	20⅞	20⅞	21	21⅛	21 5/16	21⅜
No. 2 Amber	21 1/16	21 5/16	20 15/16	21 1/16	21 1/16	21	20 15/16	20 15/16	21 1/16	21 3/16	21⅜	21 7/16
No. 3 Amber	21	21¼	20⅞	21	21	20 15/16	20⅞	20⅞	21	21⅛	21 5/16	21⅜
No. 4 Amber	20⅞	21⅛	20¾	20⅞	20⅞	20 13/16	20¾	20¾	20⅞	21	21 3/16	21¼
Rolled Brown	20⅝	20⅞	20½	20⅝	20⅝	20 9/16	20½	20½	20⅝	20¾	20 15/16	21

	Feb. 8, 1937	9	10	11	12*	13*	15	16	17	18	19	20
No. 1 Ribbed Smoked Sheet	21½	21¼	21½	21 9/16	..	..	21¼	21 1/16	21⅛	20 13/16	20 13/16	21
No. 2 Ribbed Smoked Sheet	21 7/16	21 3/16	21 7/16	21½	..	..	21 3/16	21	21 1/16	20¾	20¾	20 15/16
No. 3 Ribbed Smoked Sheet	21 7/16	21 3/16	21 7/16	21½	..	..	21 3/16	21	21 1/16	20¾	20¾	20 15/16
No. 4 Ribbed Smoked Sheet	21⅜	21⅛	21⅜	21 7/16	..	..	21⅛	20 15/16	21	20 11/16	20 11/16	20⅞
No. 1 Thin Latex Crepe	23⅛	23⅜	23⅜	23 9/16	..	..	23¼	23 5/16	23⅜	22 13/16	22 13/16	23⅛
No. 1 Thick Latex Crepe	23⅛	23⅜	23⅜	23 9/16	..	..	23¼	23 5/16	23⅜	22 15/16	22 15/16	23⅛
No. 1 Brown Crepe	21 7/16	21 3/16	21 7/16	21½	..	..	21 3/16	21	21 1/16	20¾	20¾	20 15/16
No. 2 Brown Crepe	21⅜	21⅛	21⅜	21 7/16	..	..	21⅛	20 15/16	21	20 11/16	20 11/16	20⅞
No. 2 Amber	21 7/16	21 3/16	21 7/16	21½	..	..	21 3/16	21	21 1/16	20¾	20¾	20 15/16
No. 3 Amber	21⅜	21⅛	21⅜	21 7/16	..	..	21⅛	20 15/16	21	20 11/16	20 11/16	20⅞
No. 4 Amber	21¼	21	21¼	21 5/16	..	..	21	20 13/16	20⅞	20 9/16	20 9/16	20¾
Rolled Brown	21	20¾	21	21 1/16	..	..	20¾	20 9/16	20⅝	20 9/16	20 9/16	20½

*Holiday.

RECLAIMED RUBBER

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption	Consumption % to Crude	U. S. Stocks*	Exports
1934	110,010	100,597	22.3	23,079	4,737
1935	122,140	113,530	22.9	25,069	5,383
1936					
January	11,665	10,039	20.7	26,145	572
February	10,188	7,366	20.0	28,267	455
March	10,7[illegible]2	8,767	20.5	29,161	591
April	11,382	10,333	19.9	22,274	589
May	11,512	10,398	20.6	22,852	635
June	11,935	11,547	21.9	22,738	596
July	12,330	11,816	24.6	22,602	633
August	12,856	10,993	23.6	23,750	617
September	12,959	11,170	24.1	24,950	582
October	14,737	12,606	25.5	26,389	592
November	14,357	12,029	23.9	28,135	511
December	15,938	12,984	26.2	30,573	712
1937					
January	15,129	13,366	27.4	31,610	...

*Stocks on hand the last of the month or year.
Compiled by The Rubber Manufacturers Association, Inc.

ALTHOUGH production of reclaimed rubber during January dropped off some 5% from the previous month, consumption increased slightly over 6% and equalled 27.4% of the consumption of crude rubber, a new high for several years past.

Prices have remained firm, and the demand in all lines has kept up at a lively rate with the prospect that it will continue so for the next couple of months at least.

The automobile strike did not affect the reclaimed rubber demand to any great extent beyond a few deferred deliveries, and the supply was quickly absorbed in other channels.

New York Quotations

February 25, 1937

	Sp. Grav.	¢ per Lb.
Auto Tire		
Black Select	1.16-1.18	5¾/ 6
Acid	1.18-1.22	6¾/ 7
Shoe		
Standard	1.56-1.60	6¾/ 7
Tube		
No. 1 Floating	1.00	19 /19¼
Compounded	1.10-1.12	8¾/ 9
Red Tube	1.15-1.30	8¾/ 9¼
Miscellaneous		
Mechanical Blends	1.25-1.50	4¼/ 4¾
White	1.35-1.50	14 /14½

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Tire Production Statistics

Pneumatic Casings—All Types

	Inventory	Production	Total Shipments
1934	9,454,985	47,232,748	46,686,545
1935	8,195,863	49,361,781	50,183,129
1936			
Jan.	8,917,390	4,578,994	3,875,120
Feb.	9,264,581	3,578,627	3,211,654
Mar.	9,086,719	3,640,091	3,857,352
Apr.	9,034,707	4,857,083	4,904,116
May	8,177,800	4,974,119	5,833,333
June	7,835,488	5,612,284	5,793,014
July	7,749,847	5,466,252	5,743,867
Aug.	7,798,596	5,016,593	4,977,033
Sept.	9,011,541	4,983,543	3,836,580
Oct.	10,096,204	5,125,918	4,081,931
Nov.	10,822,602	4,971,838	4,232,867
Dec.	11,114,399	5,311,007	5.015,872

Inner Tubes—All Types

	Inventory	Production	Total Shipments
1934	9,179,893	46,227,807	45,045,495
1935	8,231,351	47,879,034	48,066,904
1936			
Jan.	8,622,522	4,591,791	4,167,711
Feb.	8,699,228	3,556,098	3,445,767
Mar.	8,691,651	3,787,226	3,795,505
Apr.	8,788,043	4,824,199	4,746,265
May	8,719,467	4,818,960	4,918,715
June	8,104,830	5,034,595	5,503,564
July	7,724,790	5,177,430	5,758,273
Aug.	7,620,573	5,038,785	5,136,005
Sept.	8,626,648	5,160,815	4,230,546
Oct.	9,976,583	5,397,089	4,107,784
Nov.	10,732,073	4,739,267	3,994,958
Dec.	10,985,273	5,121,299	4,819,228

Rubber Manufacturers Association, Inc., figures representing approximately 97% of the industry for 1934 and 1935, 81% for 1936, and 80% for previous years, with the exception of gasoline consumption.

Solid and Cushion Tires

	Inventory	Production	Total Shipments
1934	34,710	197,497	187,152
1935	46,406	283,606	275,741
1936			
Jan.	40,193	25,443	22,670
Feb.	......	14,730	17,172
Mar.	......	16,004	21,350
Apr.	......	32,807	32,611
May	......	29,674	30,378
June	......	36,856	35,617
July	......	38,904	34,445
Aug.	......	33,649	28,174
Sept.	......	40,801	36,312
Oct.	......	43,601	54,741
Nov.	......	35,737	31,310
Dec.	......	41,034	40,384

	Cotton and Rubber Consumption Casings, Tubes, Solid and Cushion Tires: Cotton Fabric Pounds	Crude Rubber Pounds	Consumption of Motor Gasoline (100%) Gallons
1934	196,069,495	697,558,218	17,063,[illegible]98,000
1935	202,318,119	756,773,779	18,167,352,000
1936			
Jan.	15,987,906	61,457,999	1,367,226,000
Feb.	12,059,051	45,839,772	1,150,842,000
Mar.	13,416,664	47,872,526	1,506,582,000
Apr.	16,570,836	64,211,819	1,630,650,000
May	17,098,812	66,119,211	1,764,294,000
June	18,494,366	69,251,427	1,874,460,000
July	18,250,725	69,637,586	1,961,064,000
Aug.	17,151,577	64,998,596	1,935,402,000
Sept.	16,988,854	63,671,252	1,862,532,000
Oct.	17,569,100	66,260,974	1,858,626,000
Nov.	17,612,309	67,522,693	1,676,598,000
Dec.	18,345,900	67,457,588	1,654,506,000

PUBLICATIONS

(*Concluded from page 75*)

"Rubber Compounding Materials." The Barrett Co., 40 Rector St., New York, N. Y. This catalog gives specifications, processing properties, and applications of the company's standard products of interest to the rubber industry and includes numerous conversion tables such as specific gravity and temperature.

"Monsanto Current Events." Monsanto Chemical Co., St. Louis, Mo. This 24-page house organ is published by and for the company's employes. The December, 1936, issue contains a four-page illustrated article on "Rubber," giving some early history regarding the development of crude rubber and its vulcanization. It also contains an interesting article on "August Kekulé, Architect of Molecules and Father of Organic Chemistry." News and pictures regarding employes are shown.

"List of Inspected Fire Protection Appliances." Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill. This catalog includes 123 pages covering materials, products, and equipment used in connection with fire prevention, and seven pages of alphabetical index. Given is general information as to construction and tests, and listed are the approved suppliers with details as to the individual marking of each supplier where applicable.

"Industrial Britain." Travel and Industrial Development Association of Great Britain and Ireland, 6 Arlington St., London, S.W.1, England, and 620 Fifth Ave., New York, N. Y. This 16-page bulletin reviews current news and developments of an industrial nature in England. It is printed in German, French, and English. Page 15 of the February issue describes a new type of spraying pump for rubber plantations and field spraying.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	Commodity	City and Country
‡2,386	Garden hose	The Hague, Netherlands
†2,388	Bicycle tires	Colombo, Ceylon
§2,426	Rubber goods	Brussels, Belgium
§2,431	Surgical goods, hot water bottles, hose, and toys	Prague, Czechoslovakia
†2,432	Babies' nipples	Mayaguez, P. R.
†2,434	Surgical gloves	London, England
†2,436	Scrap tires	London, England
†2,468	Toys	Lima, Peru
†2,516	Hospital sheeting and infants' wear	Monterrey, Mexico
*2,571	Toys	Rio de Janeiro, Brazil
†2,577	Toys	Cairo, Egypt
*2,586	Elastic and non-elastic fabrics for abdominal supporters, belts, and trusses	Bogota, Colombia
*2,612	Second-hand truck tires	Batavia, Java

*Purchase. †Agency. ‡Purchase or agency. §Purchase and agency.

COTTON AND FABRICS

New York Cotton Exchange Week-End Closing Prices

Futures	Dec. 26	Jan. 30	Feb. 6	Feb. 13	Feb. 20
Jan.	12.40	.....	.....	.....	.....
Feb.	.....	12.72	12.60	.....	.....
Mar.	12.39	12.83	12.71	12.61	12.55
July	12.24	12.49	12.38	12.33	12.26
Sept.	12.02	12.13	12.02	12.05	11.98
Dec.	.....	11.87	11.75	11.87	11.78
Jan.	.....	11.86	11.73	11.86	11.79

New York Quotations

February 25, 1937

Drills		
38-inch 2.00-yard	yd.	$0.17⅜
40-inch 3.47-yard		.10⅛
50-inch 1.52-yard		.24⅜
52-inch 1.85-yard		.20½
52-inch 1.90-yard		.18⅜
52-inch 2.20-yard		.16¾
52-inch 2.50-yard		.14¾
59-inch 1.85-yard		.18⅞
Ducks		
38-inch 2.00-yard D. F.	yd.	.16 /.16¾
40-inch 1.45-yard S. F.		.23½
51½-inch 1.35-yard D. F.		.23
72-inch 1.05-yard D. F.		.32⅜
72-inch 17.21-ounce		.33⅛
MECHANICALS		
Hose and belting	lb.	.31
TENNIS		
52-inch 1.35-yard	yd.	.26
Hollands		
GOLD SEAL		
20-inch No. 72	yd.	.11
30-inch No. 72		.20
40-inch No. 72		.22
RED SEAL		
20-inch	yd.	.09⅝
30-inch		.18
40-inch		.19¼
50-inch		.27
Osnaburgs		
40-inch 2.34-yard	yd.	.12¾/.15
40-inch 2.48-yard		.12⅛/.14⅛
40-inch 2.56-yard		.11¾
40-inch 3.00-yard		.11⅔
40-inch 7-ounce part waste		.11¼
40-inch 10-ounce part waste		.15⅝
37-inch 2.42-yard		.14¼
Raincoat Fabrics		
COTTON		
Bombazine 60 x 64	yd.	.11
Plaids 60 x 48		.14½
Surface prints 60 x 64		.16
Print cloth, 38½-inch, 60 x 64		.07¾
SHEETINGS, 40-INCH		
48 x 48, 2.50-yard	yd.	.12¼
64 x 68, 3.15-yard		.12
56 x 60, 3.60-yard		.10¼
44 x 40, 4.25-yard		.08
SHEETINGS, 36-INCH		
48 x 48, 5.00-yard	yd.	.06¾
44 x 40, 6.15-yard		.06½
Tire Fabrics		
BUILDER		
17¼ ounce 60" 23/11 ply Karded peeler	lb.	.35
CHAFER		
14 ounce 60" 20/8 ply Karded peeler	lb.	.35
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.33½
CORD FABRICS		
23/5/3 Karded peeler, 1 1/16" cotton	lb.	.38
15/3/3 Karded peeler, 1 1/16" cotton	lb.	.35
23/5/3 Karded peeler, 1¼" cotton	lb.	.43
23/5/3 Combed Egyptian	lb.	.53
LENO BREAKER		
8¼ ounce and 10¼ ounce 60" Karded peeler	lb.	.37

The accompanying table of New York Cotton Exchange week-end closing prices shows the general trend of representative futures during approximately the last two months. Prices have remained practically at a standstill. Spot middlings at 12.97¢ on January 22 went up gradually to 13.33¢ on January 30, the high for the month, and then slowly fell off to 12.97¢ on February 18.

Total sales at 13 southern markets during 21 days were 176,251 bales as compared with 226,483 bales for the same days a year ago. Average prices at ten designated southern markets followed closely, but trailed the New York middlings prices at from 15 to 25 points.

On January 26 the Commodity Credit Corp. announced that between February 1 and April 1 it would release reasonable amounts of the 3,000,000 bales of Government 12¢ loan cotton when the average price of middlings at ten designated southern markets was 12.75¢ or better, with allowances for grade differences and locations. This announcement was interpreted to mean that for the present only higher grades would be released as release prices on lower grades were higher than the market and that limited quantities would be released. Secretary Wallace in a radio speech suggested it would be wise to produce cotton as abundantly as possible next season, which was suggestive of a larger crop; yet federal agents were reported to be leasing land out of production, and flood conditions might delay spring preparation of the soil.

The settling of the Pacific Coast maritime strike released about 300,000 bales which had been tied up for a long time, but most of this was thought to be headed for the Orient. A report that details of the German-American barter arrangement involving cotton had been disclosed in Germany indicated that limited quantities would be sold to Germany. It was announced February 17 that an agreement negotiated between the American and Japanese textile industries placing imports of Japanese piece goods on a quota basis of 255,000,000 square yards total for the next two years would prevent flooding this country with Japanese textiles. Dr. Claudius T. Murchison, president of the Cotton-Textile Institute, reported that had the agreement not been reached, imports of Japanese textiles this year alone probably would have reached 500,000,000 square yards.

General opinion is divided regarding the probability of higher prices, but it is felt that March activity may indicate future trends.

Fabrics

The cotton textile market continues firm in the matter of prices with the demand for cloth active. Stocks in the hands of producers are exceptionally low, and prices on fabrics wider than 40-inch show a strong tendency to advance—in fact in some cases have advanced sharply. In many instances loom products are under contract engagement through the third quarter of 1937, and some textile distributers are inclined to refuse business involving deliveries later than June, 1937, hoping thereby to escape the possible necessity of contract adjustments such as might otherwise be called for by later developments.

Cotton of grade and staple entering into these converting fabrics is scarce, with prices moving into unusually high range. Current prices for desirable grades are from 14¼ to 15⅜¢ a pound.

United States Latex Imports

Year	Pounds	Value
1934	29,276,134	$3,633,253
1935	30,358,748	3,782,222
1936	44,469,504	6,659,899
1936		
Jan.	3,733,665	474,682
Feb.	3,268,542	406,985
Mar.	3,196,083	417,704
Apr.	3,610,511	522,049
May	3,296,351	490,769
June	4,250,178	657,311
July	3,729,418	579,895
Aug.	3,944,962	602,992
Sept.	4,031,355	692,810
Oct.	3,117,748	500,817
Nov.	3,654,392	578,729
Dec.	4,636,299	735,156

Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Com.	$1.00, resumed	Dec 24	......
Canada Wire & Cable, Ltd.	Pfd.	$1.75	Mar. 20	Mar. 1
Dayton Rubber Mfg. Co.	Class A	$1.00, accum.	Mar. 15	Mar. 1
Faultless Rubber Co.	Com.	$0.50 q.	Apr. 1	Mar. 15
Garlock Packing Co.	Com.	$0.25 q.	Mar. 31	Mar. 20
Garlock Packing Co.	Com.	$0.25, Extra	Mar. 31	Mar. 20
B. F. Goodrich Co.	Cum. Pfd., New	$1.25	Mar. 31	Mar. 26
Goodyear Tire & Rubber Co.	$5 Pfd., New	$1.25 q.	Mar. 31	Mar. 15
Goodyear Tire & Rubber Co.	Com.	$0.50, resumed	Apr. 5	Mar. 20
Goodyear Tire & Rubber Co.	$7 Pfd.	$14.75, accum.	Mar. 25	Mar. 15
Mid-West Rubber Reclaiming Co.	(N.P.)	$1.00 q.	Mar. 1	Feb. 19
Okonite Co.	6% Pfd.	$1.50 q.	Mar. 1	Feb. 23
Okonite Co.	7% Pfd.	$1.75, accum.	Mar. 1	Feb. 23
Raybestos-Manhattan, Inc.	Com.	$0.37½ q.	Mar. 15	Feb. 26
Tyer Rubber Co.	6% Pfd.	$1.50 q.	Feb. 15	Feb. 11
United Elastic Corp.	Com.	$0.15 q.	Mar. 24	Mar. 5

IMPORTS, CONSUMPTION, AND STOCKS

CRUDE rubber consumption by United States manufacturers for January, 1937, is estimated at 48,744 long tons, against 49,626 long tons for December, 1936, 1.8% under December and less than 1% above the January, 1936, revised figure of 48,506 long tons, according to R. M. A. statistics.

Crude rubber imports for January were 32,820 long tons, 42.5% under the December figure of 57,049 long tons, but 4.9% over the 31,292 long tons imported in January, 1936.

The estimated total domestic stocks of crude rubber on hand January 31 were 201,915 long tons, compared with December 31 stocks of 218,844 long tons and 285,054 (revised) long tons on hand January 31, 1936.

Crude rubber afloat to United States ports on January 31 is estimated at 55,096 long tons, against 56,567 long tons afloat December 31 and 43,870 long tons afloat January 31, 1936.

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Imports* Tons	U. S. Consumption Tons	U. S. Stocks Mfgrs., Importers, Dealers, Etc.† Tons	U. S. Stocks Afloat† Tons	U. K.— Public Warehouses, London, Liverpool†‡ Tons	Singapore and Penang Dealers and Port Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1934	469,484	453,223	355,000	47,644	134,927	62,142	1,019,200	944,141	729,391
1935	448,116	491,544	303,000	39,094	164,295	28,304	872,722	942,924	634,196
1936									
January ...	31,292	48,506	285,054	43,870	162,107	31,195	62,726	83,993	569,826
February ..	**35,219**	**36,746**	**282,902**	**46,532**	157,028	38,421	64,019	68,635	572,323
March	37,451	42,703	276,823	58,935	**147,712**	**29,322**	69,252	80,132	590,475
April	40,370	51,897	264,228	47,678	140,404	32,200	60,030	85,336	527,178
May	35,598	50,482	248,317	48,860	130,590	26,687	68,838	90,090	501,582
June	41,835	52,636	245,886	47,228	122,285	28,260	66,478	87,830	**532,992**
July	35,881	48,127	234,498	60,343	113,386	29,493	83,850	86,698	**490,074**
August	42,563	46,657	229,056	63,597	108,215	28,289	71,213	81,378	468,238
September.	48,386	46,330	228,477	62,240	103,962	26,936	72,314	82,288	490,961
October ...	40,920	49,509	219,553	67,825	96,625	24,593	81,756	91,595	448,560
November..	44,296	50,303	212,515	73,691	88,781	26,761	78,605	91,595	437,069
December..	57,049	49,626	218,844	56,567	78,462	26,969	77,241	93,953	455,205
1937									
January...	32,820	48,744	201,915	55,096	......	......	......	......	......

* Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, and afloat.

London and Liverpool Stocks

Week Ended	London Tons	Liverpool Tons
Jan. 30	29,131	41,900
Feb. 6	27,856	40,699
Feb. 13	26,541	39,320
Feb. 20	26,270	38,618
Feb. 27	26,562	37,231

TRADE MARKS

(*Continued from page 74*)

pero Siameez." Hose. Electric Hose & Rubber Co., Wilmington, Del.

341,395. **Siameez.** Hose. Electric Hose & Rubber Co., Wilmington, Del.

341,396. **Supero.** Hose. Electric Hose & Rubber Co., Wilmington, Del.

341,409. **Zephyr.** Automobile top dressing. Goodyear Tire & Rubber Co., Akron, O.

341,440. **Pant-e-lastic.** Elastics for wearing apparel. Narrow Fabric Co., West Reading, Pa.

341,545. **Pullman.** Cements, tire cut filler, bicycle stop-leak tire fluid, etc. Pullman Chemical Co., Camden, N. J.

341,580. **Kaysam.** Molds for casting rubber soles. Rubber-Gel Products Corp., North Quincy, Mass.

341,581. **Kaysam.** Tubing and hose. Rubber-Gel Products Corp., North Quincy, Mass.

341,661. **Speed Duty.** Tires and inner tubes. Badger Rubber Works, Chicopee Falls, Mass.

341,696. Representation of a bell containing the initials: **"B. K.,"** and above the representation, the words: **"3 Bells."** Prophylactic rubber articles. B. Kram, doing business as Bell Specialty Co., Malverne, L. I., N. Y.

341,720. Letters: **"AAAAA"** in fanciful formation. Vulcanizing rubber, etc. Frederick H. Cone & Co., Inc., New York, N. Y.

341,721. Letters **"AAAA"** in fanciful formation. Vulcanizing rubber, etc. Frederick H. Cone & Co., Inc., New York, N. Y.

341,722. Letters: **"AAA"** in pyramid formation. Vulcanizing rubber, etc. Frederick H. Cone & Co., Inc., New York, N. Y.

341,723. Letters: **"AA."** Vulcanizing rubber, etc. Frederick H. Cone & Co., Inc., New York, N. Y.

341,724. Letter: **"A."** Vulcanizing rubber, etc. Frederick H. Cone & Co., Inc., New York, N. Y.

341,750. **Kaysam.** Syringes. Rubber Gel Products Corp., N. Quincy, Mass.

341,790. **Duroil.** Hose. Hewitt Rubber Corp., Buffalo, N. Y.

341,791. **Dogwood.** Belting. Hewitt Rubber Corp., Buffalo, N. Y.

341,934. **Kaysam.** Toys and inflation bladders for balls. Rubber-Gel Products Corp., N. Quincy, Mass.

341,998. **Golden Flush.** Balls. Great Western Athletic Goods Co., Chicago, Ill.

342,068. **Westminster.** Tires and inner tubes. Westminster Tire Corp., New York, N. Y.

342,083. **Dual 10.** Tires. General Tire & Rubber Co., Akron, O.

342,110. **Kool-flex.** Tires. Goodyear Tire & Rubber Co., Akron, O.

342,141. Label containing representation of two sprays of Acacia, and below them the words: **"Acacia Cloth."** Rubber and fiber sheet material. Hood Rubber Co., Inc., Wilmington, Del.

342,172. **Vulcord.** Golf balls. L. A. Young Co., Detroit, Mich.

342,188. **Sentry.** Tires. B. F. Goodrich Co., New York, N. Y.

342,340. Circular label containing the words: **"Neverslip Rug Dressing."** Anti-slip rug dressing. E. J. de Golier, doing business as Neverslip Dressing Co., Bradford, Pa.

342,361. **Caledonian.** Tires. United States Rubber Products, Inc., New York, N. Y.

342,384. **Multi-grip.** Tires. Fisk Rubber Corp., Chicopee Falls, Mass.

342,410. **Hallene.** Girdles, corsets, brassieres, and foundation garments. Poirette Corsets, Inc., New York, N. Y.

342,445. **May Joie.** Corsets, girdles, etc. May Department Stores Co., New York, N. Y.

342,450. **Mimi.** Corsets. John Wanamaker New York, New York, N. Y.

342,482. **Kaysam.** Boots, heels, and soles. Rubber-Gel Products Corp., N. Quincy, Mass.

342,483. **Texas Ranger.** Raincoats. Chicago Rubber Clothing Co., Racine, Wis.

342,526. **Matador.** Sponges. Vereinigte Gummiwaren-Fabriken Wimpassing vormals Menier-J. N. Reithoffer, Vienna, Austria.

342,562. **Moss Elite.** Rubber printing stamps. Samuel H. Moss, Inc., New York, N. Y.

342,615. **W. B.** Corsets, girdles, brassieres, and foundation garments. W. B. Foundations, Inc., Newark, N. J.

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Trafalgar Sq., London, W.C.2, England, gives the following figures for January, 1937:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

To	Sheet and Crepe Rubber Tons	Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons
United Kingdom......	3,113	326
United States.........	21,451	958
Continent of Europe..	9,379	402
British possessions ...	1,292	26
Japan	3,404	41
Other countries	1,168	11
Totals	39,807	1,764

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber (Dry Weight) Tons
Sumatra	4,351	858
Dutch Borneo	2,026	26
Java and other Dutch islands.	406	...
Sarawak	2,969	...
British Borneo	508	33
Burma	282	15
Siam	2,079	894
French Indo-China	167	244
Other countries	86	12
Totals	14,874	2,082

COMPOUNDING INGREDIENTS

WHILE the automobile strike has been settled, the effect on prices has been very little for the majority of tire companies continued to manufacture and use ingredients. However they had been buying cautiously because of the indefiniteness as to the possible extent of the strike. In general while the demand has increased some, prices remained substantially the same throughout the month.

CARBON BLACK. Although tire consumption was not too strong in early February, the paint industry was active, and in the last part of February shipments were moving at a good rate. However an ample supply is available. Prices remained steady.

FACTICE. The demand for factice and rubber substitutes remains steady. But a bill has been introduced before the House of Representatives proposing a 6¢ per pound tax on imported oils. If passed, this bill will cause a very serious upset in the industry.

LITHARGE. During early February battery makers curtailed production, and during that period prices remained the same. As soon, though, as the normal demand was resumed, the price was raised to 8 or 8¼¢ per lb. c.l.

LITHOPONE. The demand was quite active during February, but prices remained the same as in January.

RUBBER CHEMICALS. The demand for accelerators and antioxidants has remained good, while prices are steady. The general price is expected to remain about the same although in isolated instances there may be some rise due to cost of raw materials; yet an ample supply appears available.

RUBBER COLORS. In some instances prices rose around the first of the year. Chromium oxide increased to 20¢ a pound in December because of higher labor and raw material cost. The demand has held up despite the late 1936 price increases. During 1937 prices have remained at about the same level.

RUBBER SOLVENTS. The demand has been steady although until the automobile strike was settled, tire manufacturers were buying cautiously. During February prices went to 6⅞¢ and 7¢ per gallon and later to 7⅜¢ and 7⅞¢ per gallon.

STEARIC ACID. Since the price increase in January the price has remained steady, and demand has been fair.

TITANIUM PIGMENTS. Since the first of the year the demand has been very brisk, and prices have held firm at quoted levels.

ZINC OXIDE. The market situation is exceptionally strong, and there appears to be a shortage of high grade zinc as is used to produce the oxide for the rubber trade. It is quite probable that there will be an advance of ½¢ per pound in the near future, and if the situation remains the same as to the supply of zinc and the demand for oxide, the price may go higher later in the year.

New York Quotations

February 25, 1937

Prices Not Reported Will Be Supplied on Application

Abrasives			
Pumicestone, powdered	lb.		
Rottenstone, domestic	lb.	$0.03	/$0.03½
Silica, 15	ton	38.00	
Accelerators, Inorganic			
Lime, hydrated	ton	20.00	
Litharge (commercial)	lb.	.08½	
Accelerators, Organic			
A-1	lb.	.24	/ .28
A-5-10	lb.	.31	/ .40
A-10	lb.	.31	/ .40
A-11	lb.	.53	/ .65
A-16	lb.		
A-19	lb.	.53	/ .65
A-32	lb.	.70	/ .80
A-77	lb.	.43	/ .55
Accelerator 49	lb.	.42	
808	lb.		
833	lb.		
Acrin	lb.		
Aldehyde ammonia	lb.		
Altax	lb.		
B-J-F	lb.		
Beutene	lb.		
Butyl Zimate	lb.		
C-P-B	lb.		
Captax	lb.		
Crylene	lb.		
Paste	lb.		
D-B-A	lb.		
Di-Esterex	lb.		
Di-Esterex-N	lb.		
DOTG	lb.	.47	
D.O.T.T.U.	lb.		
DPG	lb.	.35	/ .40
El-Sixty	lb.	.50	/ .65
Ethylideneaniline	lb.		
Formaldehyde P.A.C.	lb.		
Formaldehydeaniline	lb.		
Formaldehyde-para-toluidine	lb.		
Guantal	lb.	.40	/ .50
Hepteen	lb.		
Base	lb.		
Hexamethylenetetramine	lb.		
Lead oleate, No. 999	lb.	.12	
Witco	lb.	.13	
Methylenedianilide	lb.		
Monex	lb.		
Novex	lb.		
O. N. V.	lb.		
Ovac	lb.		
Pipsolene	lb.	1.55	/ 1.85
R-2	lb.	1.40	/ 1.80
Base	lb.	3.25	/ 3.75
R & H 50-D	lb.		
Safex	lb.		
Super-sulphur No. 1	lb.		
No. 2	lb.		
Tetrone A	lb.		
Thiocarbanilide	lb.		
Thionex	lb.		
Trimene	lb.		
Base	lb.		
Triphenyl guanidine (TPG)	lb.		
Tuads	lb.		
Ureka	lb.	$0.60	/$0.75
Blend B	lb.	.60	/ .75
C	lb.	.56	/ .65
Vulcanex	lb.		
Vulcanol	lb.		
Vulcone	lb.		
Z-B-X	lb.		
Z-88-P	lb.	.46	/ .58
Zenite	lb.		
A	lb.		
B	lb.		
Zimate	lb.		
ZML	lb.		
Activator			
Barak	lb.		
Age Resisters			
AgeRite Alba	lb.		
Exel	lb.		
Gel	lb.		
Hipar	lb.		
HP	lb.		
Powder	lb.		
Resin	lb.		
D	lb.		
Syrup	lb.		
White	lb.		
Akroflex C	lb.		
Albasan	lb.		
Antox	lb.		
B-L-E	lb.		
B-X-A	lb.		
Copper Inhibitor X-872	lb.		
Flectol B	lb.	.52	/ .65
H	lb.	.52	/ .65
White	lb.	.90	/ 1.15
M-U-F	lb.		
Neozone (standard)	lb.		
A	lb.		
C	lb.		
D	lb.		
E	lb.		
Oxynone	lb.	.64	/ .75
Parazone	lb.		
Perflectol	lb.	.65	/ .75
Permalux	lb.		
Santoflex A	lb.	.65	/ .75
Solux	lb.		
Thermoflex	lb.		
A	lb.		
V-G-B	lb.		
Alkalies			
Caustic soda, flake, Columbia (400 lb. drums)	100 lbs.	3.00	/ 4.00
liquid, 50%	100 lbs.	2.25	
solid (700 lb. drums)	100 lbs.	2.60	/ [illegible].00
Antiscorch Materials			
Antiscorch T	lb.		
Cumar RH	lb.	$0.09	
Retarder B	lb.		
W	lb.		
T-J-B	lb.		
U.T.B.	lb.		
Antisun Materials			
Heliozone	lb.		
Sunproof	lb.		
Brake Lining Saturant			
B. R. T. No. 3	lb.	.0165/	/$0.0175
Colors			
BLACK			
Lampblack (commercial)	lb.	.15	
BLUE			
Brilliant	lb.		
Prussian	lb.	.37½	
Toners	lb.	.80	/ 3.50
BROWN			
Mapico	lb.	.13	
GREEN			
Brilliant	lb.		
Chrome, light	lb.		
medium	lb.		
oxide	lb.	.20	
Dark	lb.		
Guignet's	lb.	.70	
Light	lb.		
Toners	lb.	.85	/ 3.50
ORANGE			
Lake	lb.		
Toners	lb.	.40	/ 1.60
ORCHID			
Toners	lb.	1.50	/ 2.00
PINK			
Toners	lb.	1.50	/ 4.00
PURPLE			
Permanent	lb.		
Toners	lb.	.60	/ 2.00
RED			
Antimony			
Crimson, 15/17%	lb.	.50	
R. M. P. No. 3	lb.	.46	
Sulphur free	lb.	.48	
Golden 15/17%	lb.	.28	
7-A	lb.	.35	
Z-2	lb.	.22	
Aristi	lb.	1.75	
Cadmium, light (400 lb. bbls.)	lb.	.70	
Chinese	lb.		
Crimson	lb.		
Mapico	lb.	.09¼	
Medium	lb.		
Rub-Er-Red	lb.	.94¼	

Scarlet	lb.	
Toners	lb.	$0.80 /$2.00
WHITE		
Lithopone (bags)	lb.	.04¼/ .04½
Albalith Black Label-11	lb.	.04¼/ .04½
Astrolith (5-ton lots)	lb.	.04¼
Azolith	lb.	.04¼/ .04½
Cryptone-19	lb.	.05¾/ .06
CB-21	lb.	.05¾/ .06
ZS No. 20	lb.	.09 / .09¼
No. 86	lb.	.09 / .09¼
Sunolith (5-ton lots)	lb.	.04¼
Ray-Bar	lb.	
Ray-Cal	lb.	
Rayox	lb.	
Titanolith (5-ton lots)	lb.	.05¾
Titanox-A (50-lb. bags)	lb.	.16 / .16¾
B (50-lb. bags)	lb.	.05¾/ .06
B-30 (50-lb. bags)	lb.	.05¾/ .06
C (50-lb. bags)	lb.	.05¾/ .06
Ti-Tone	lb.	
Zinc Oxide		
Anaconda, Green Seal No. 333	lb.	.06¼/ .06½
Lead Free No. 352	lb.	.05¼/ .05½
No. 570	lb.	.05¼/ .05½
No. 577	lb.	.05¼/ .05½
Red Seal No. 222	lb.	.05¾/ .06
U.S.P. No. 777 (bbls.)	lb.	.08
White Seal No. 555	lb.	.06¾/ .07
Azo ZZZ-11	lb.	.05¼/ .05½
44	lb.	.05¼/ .05½
55	lb.	.05¼/ .05½
66	lb.	.05¼/ .05½
French Process, Florence White Seal-7 (bbls.)	lb.	.06¾/ .07
Green Seal-8	lb.	.06¼/ .06½
Red Seal-9	lb.	.05¾/ .06
Kadox, Black Label-15	lb.	.05¼/ .05½
Blue Label-16	lb.	.05¼/ .05½
Red Label-17	lb.	.05¼/ .05½
Horse Head Special 3	lb.	.05¼/ .05½
XX Red-4	lb.	.05¼/ .05½
23	lb.	.05¼/ .05½
72	lb.	.05¼/ .05½
78	lb.	.05¼/ .05½
80	lb.	.05¼/ .05½
103	lb.	.05¼/ .05½
110	lb.	.05¼/ .05½
St. Joe (lead free)		
Black Label	lb.	.05¼/ .05½
Green Label	lb.	.05¼/ .05½
Red Label	lb.	.05¼/ .05½
U.S.P. X	lb.	.08 / .08¼
White Jack	lb.	.09 / .09¼
YELLOW		
Cadmolith (cadmium yellow), 400 lb. bbls.	lb.	.45
Lemon	lb.	
Mapico	lb.	.09½
Toners	lb.	2.50

Dispersing Agents

Bardol	lb.	.0215/ .024
Darvan	lb.	

Factice

Amberex	lb.	.23
Brown	lb.	.10 / .14
Neophax A	lb.	.13
B	lb.	.13
Fac-Cel B	lb.	.16
C	lb.	.16
White	lb.	.10 / .16

Fillers, Inert

Asbestine, c.l., f.o.b. mills	ton	15.00
Barytes	ton	30.00
f.o.b. St. Louis (50 lb. paper bags)	ton	22.85
off color, domestic	ton	20.00 /25.00
white, imported	ton	29.00 /32.00
Blanc fixe, dry, precip.	lb.	.03½/ .05
Calcene	ton	37.50 /45.00
Infusorial earth	lb.	.02 / .03
Kalite No. 1	ton	
No. 3	ton	
Magnesia, calcined, heavy	lb.	.04
carbonate	lb.	.06½/ .08½
Pyrax	ton	
Whiting		
Columbia Filler	ton	9.00 /14.00
Domestic	100 lbs.	
Guilders	100 lbs.	
Hakuenka	lb.	
Paris white, English cliffstone	100 lbs.	
Southwark Brand, Commercial	100 lbs.	
All other grades	100 lbs.	
Suprex, white extra light	ton	45.40 /60.00
heavy	ton	45.40 /60.00
Witco, c.l.	ton	7.00

Fillers for Pliability

P-33	lb.	
Thermax	lb.	
Velvetex	lb.	.03 / .04½

Finishes

IVCO lacquer, clear	gal.	1.00 / 2.25
colors	gal.	2.85 / 3.25
Rubber lacquer, clear	gal.	
colored	gal.	
Starch, corn, pwd.	100 lbs.	
potato	lb.	
Talc	ton	25.00 /45.00

Flock

Cotton flock, dark	lb.	$0.11½/$0.14
dyed	lb.	.50
white	lb.	.14½/ .20
Rayon flock, colored	lb.	1.25 / 1.60
white	lb.	1.10

Latex Compounding Ingredients

Accelerator 85	lb.	
89	lb.	
122	lb.	
552	lb.	
Alphasol-OS	lb.	.60
Antox, Dispersed	lb.	
Aquarex A	lb.	
D	lb.	
F	lb.	
Areskap No. 50	lb.	.18 / .24
No. 100, dry	lb.	.39 / .51
Aresket No. 240	lb.	.16 / .22
No. 250, alcoholic	lb.	.19 / .26
No. 300, dry	lb.	.42 / .50
Aresklene No. 375	lb.	.35 / .50
No. 400, dry	lb.	.51 / .65
Black No. 25, Dispersed	lb.	.22 / .40
Catalpo	ton	
Color Pastes, Dispersed	lb.	
Dispersex No. 15	lb.	.80 / .95
No. 20	lb.	.60 / .75
Emo, brown	lb.	.15
white	lb.	.15
Factice Compound, Dispersed	lb.	.36
Heliozone, Dispersed	lb.	
Igepon A.	lb.	
MICRONEX, Colloidal	lb.	.06 / .07
Nekal BX (dry)	lb.	
Palmol	lb.	.12
Paradors	lb.	
S.1. (50-55 gallon drums)	lb.	.65
Stablex A	lb.	1.75
B	lb.	.90
C	lb.	.30
Sulphur, Dispersed	lb.	.10 / .15
No. 2	lb.	
T.1. (400 lb. drums)	lb.	.40
Tepidone	lb.	
Vulcan Colors	lb.	
Zinc oxide, Colloidal	lb.	
Dispersed	lb.	.09 / .15

Mineral Rubber

B. R. C. No. 20	lb.	.009 / .01
Black Diamond	ton	25.00
Genasco Hydrocarbon, granulated, (fact'y)	ton	
solid	ton	
Gilsonite Hydrocarbon (factory)	ton	
Hydrocarbon, hard	ton	
soft	ton	
Parmr Grade 1	ton	25.00
Grade 2	ton	25.00
Pioneer	ton	
265°	ton	

Mold Lubricants

Mold Paste	lb.	.12 / .30
Sericite	ton	65.00 /75.00
Soapbark	lb.	
Soapstone	ton	25.00 /35.00

Oil Resistant

AXF	lb.	

Reclaiming Oils

B. R. V.	lb.	.03 / .0325
S. R. O.	lb.	.0175/ .0185

Reenforcers

Carbon Black		
Aerfloted Arrow Specification Black	lb.	.0535/ .0825
Arrow Compact Granulized Carbon Black	lb.	
"Certified" Heavy Compressed, Cabot	lb.	
Spheron	lb.	
Disperso, c.l.	lb.	.0445/ .0535
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Dixiedensed, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Dixiedensed 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Excello, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0535/ .0735
l.c.l., delivered New York	lb.	.07 / .08¼
Fumonex, c.l., f.o.b. works	lb.	.03
ex-warehouse	lb.	.04½
Gastex	lb.	$0.03 /$0.07
Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Kosmobile 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
MICRONEX Beads, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Mark II, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Standard, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
W-5, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
W-6, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Pelletex	lb.	.03 / .07
Supreme, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0535/ .0735
l.c.l., delivered New York	lb.	.07 / .08¼
"WYEX BLACK"	lb.	
Carbonex	lb.	.029 / .0315
Carbonex "S"	lb.	.0315/ .034
Clays		
Aerfloted Paragon (bulk)	ton	6.50
Suprex No. 1 Selected	ton	10.00
No. 2 Standard	ton	9.00
China	ton	17.50 /20.00
Dixie	ton	
Junior	ton	
McNamee	ton	
Par	ton	
Witco	ton	9.00
Cumar EX	lb.	.035

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Paradors	lb.	
Rodo No. 0	lb.	
No. 10	lb.	

Rubber Substitutes

Black	lb.	.07½/ .11
Brown	lb.	.08½/ .14
White	lb.	.09 / .15

Softeners

Burgundy pitch	lb.	.06
Cycline oil	gal.	.15 / .28
Palm oil (Witco)	lb.	.07
Pine tar	gal.	
Plastogen	lb.	
Reogen	lb.	
Rosin oil, compounded	gal.	.40
RPA No. 1	lb.	
Rubtack	lb.	.10
Tackol	lb.	.085 / .18
Tonox	lb.	
Powder	lb.	
Witco No. 20	gal.	.18

Softeners for Hard Rubber Compounding

RSL Resin	lb.	
Resin C Pitch 55° C. M.P.	lb.	.0125/ .0135
Resin C Pitch 70° C. M.P.	lb.	.0125/ .0135
Resin C Pitch 85° C. M.P.	lb.	.0125/ .0135

Solvents

Beta-Trichlorethane	gal.	
Bondogen	lb.	
Carbon bisulphide	lb.	
tetrachloride	lb.	

(*Continued on page* 88)

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge.*

SITUATIONS WANTED

CALENDER AND MILL FOREMAN WITH PRACTICAL EXPERIence in tire, footwear and sundries production, at present employed, desires to make a change. Address Box No. 778, care of INDIA RUBBER WORLD.

FACTORY SUPERINTENDENT OR ASSISTANT, EXPERIENCED in soft and hard rubber, mechanicals, calenders, mills and presses. Knowledge in compounding, development, costs and manufacture of bakelite, tenite, and other plastics. Address Box No. 783, care of INDIA RUBBER WORLD.

WANTED: A POSITION OF RESPONSIBILITY, BY A RUBBER chemist with considerable experience, one where initiative and ability are of more value than actual experience. Best references. Now holding responsible position. Address Box No. 784, care of INDIA RUBBER WORLD.

SALESMAN: MECHANICAL RUBBER GOODS, METROPOLITAN New York territory, experienced. Drawing account against commissions. Address Box No. 788, care of INDIA RUBBER WORLD.

WANTED: POSITION AS FOREMAN IN CALENDER AND MILL room. Have 20 years' experience in mechanicals, tires, and footwear. Reference if desired. Address Box No. 789, care of INDIA RUBBER WORLD.

RUBBER COMPOUNDER, EXPERIENCED COMPOUNDING, DEvelopment, research mechanical goods, chemical analysis and testing. Chemistry graduate, Eastern university. Age 28. At present employed, desires change. Address Box No. 791, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

A NEW ENGLAND RUBBER COMPANY WANTS A CHEMIST who has had practical experience in rubber laboratory. One who understands general laboratory routine and can carry on some development work. Address Box No. 779, care of INDIA RUBBER WORLD.

RUBBER CHEMIST, THOROUGHLY TRAINED AND EXPERIenced in compounding, development, electrical insulated rubber cords. Excellent opportunity. Give complete information. Address Box No. 780, care of INDIA RUBBER WORLD.

WANTED: TWO YOUNG MEN TO WORK IN LABoratory. Some previous experience and technical training desirable, but not absolutely necessary. Address Box No. 790, care of INDIA RUBBER WORLD.

SITUATIONS OPEN—Continued

WANTED

A Technical Manager and Organizer who can contribute all necessary technical and manufacturing details to institute production of a synthetic rubber abroad.

PLEASE STATE:

1. Former experience in this field.
2. General characteristics and qualities of your product in comparison with rubber and its suitability for tire production.
3. Cost of manufacture and an estimated cost of installation.
4. Indication of raw materials (domestic or foreign).

Address Box No. 782, care of INDIA RUBBER WORLD

BUSINESS OPPORTUNITIES

CHEMIST, EXECUTIVE, WITH MANY YEARS' SUCCESSFUL experience in the manufacture of rubber thread and mechanical goods for the paper and textile industries, wants to go into business for himself. South preferred. Desires to rent space in rubber mill that can furnish necessary equipment. Address Box No. 781, care of INDIA RUBBER WORLD.

FOR RENT

Small rubber plant located in New York City with three mills in good condition and two pot vulcanizers at a very reasonable rental. Address Box No. 785, care of INDIA RUBBER WORLD.

FOR SALE: RUBBER TIRE MANUFACTURING PLANT IN EAST. 140,000 square feet floor space. Modern and equipped. Unusual opportunity. Available for immediate occupancy. Address Box No. 786, care of INDIA RUBBER WORLD.

MACHINERY AND SUPPLIES FOR SALE

FINAL LIQUIDATION OF EQUIPMENT AT MURRAY RUBBER CO., TRENTON, N. J.

1 Farrel 3-roll 66" Calender; 1 400 H.P. Thropp herringbone reduction gear drive; 1 250 H.P. Chain Drive; 8 Hydraulic Presses, 8" by 8" to 30" by 30"; 1 No. 4 Royle Tuber, motor drive; 1 Jacketed Vulcanizer, 4' by 6'; 1 Laboratory 2-roll Calender, 14" by 14". **Miscellaneous: Compressors;** Hoists; Laboratory Equipment; Magnetic Pulleys; Scales; Trucks; etc. REPRESENTATIVE ON PREMISES. ARRANGE FOR INSPECTION. PRICED LOW FOR QUICK REMOVAL. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York, N. Y. Barclay 7-0600.

FOSTER D. SNELL, INC.
Chemists—Engineers
Every form of Chemical Service
305 Washington Street **Brooklyn, N. Y.**
215 N. Calvert Street, Baltimore, Maryland

TERKELSEN MACHINE COMPANY
Manufacturers of
SPIRAL WRAPPING MACHINES
for
COILS OF STEEL, WIRE AND HOSE
Write for Particulars
325 A Street **Boston, Mass.**

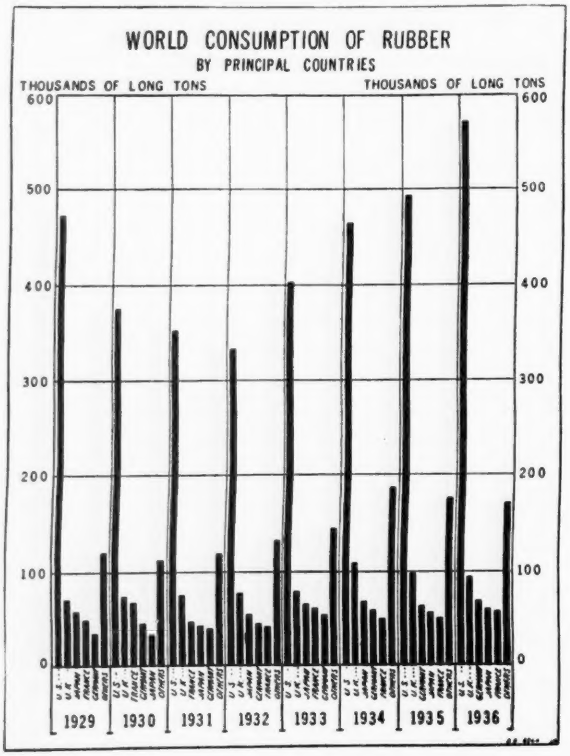
CALENDER SHELLS
ANY DIAMETER, ANY LENGTH
The W. F. Gammeter Co., Cadiz, Ohio

We Have a Completely Equipped Plant for Manufacturing
RUBBER SPECIALTIES
Backed by years of experience.
Let us quote on your requirements without obligation, of course.
ADMIAR RUBBER CO.
273 Van Sinderen Ave., **Brooklyn, N. Y.**
Division of Ideal Novelty & Toy Co., Inc.
Long Island City, New York

GUARANTEED REBUILT MACHINERY
IMMEDIATE DELIVERIES FROM STOCK
MILLS, CALENDERS, TUBERS, HYDRAULIC PRESSES, PUMPS, VULCANIZERS, TIRE MAKING EQUIPMENT, MOULDS, ETC.
UNITED RUBBER MACHINERY EXCHANGE
319-323 FRELINGHUYSEN AVE., **Cable Address "Urme"** **NEWARK, N. J.**

(*Advertisements continued on page 89*)

World Consumption in 1936



World consumption of rubber in 1936, the largest on record, is estimated at over 1,025,000 long tons, of which the United States consumed 573,500 tons, or 56.0%. Previous to 1936 the highest world's total was 965,000 long tons in 1934; and for the United States the highest figure was 492,000 tons in 1935. *Commerce Reports.*

New York Quotations

(*Continued from page 84*)

Stabilizers for Cure		
Laurex, ton lots	*lb.*	
Stearex B	*lb.*	$0.11½/$0.12½
Beads	*lb.*	.10½
Stearic acid, single pressed	*lb.*	.11½
Stearite	100 *lbs.*	10.50 /11.50
Zinc stearate	ffi...ffi..*lb.*	.23
Synthetic Rubber		
Neoprene Latex Type 50	*lb.*	
53	*lb.*	
54	*lb.*	
Type E.	*lb.*	
"Thiokol" A (f.o.b. Yardville)	*lb.*	.35
Coating Materials		
C-1 Series	*gal.*	5.50
C-200 Series	*gal.*	3.75 / 4.25
D	*lb.*	.65
Molding Powder	*lb.*	.55 / .70
Tackifier		
B. R. H. No. 2	*lb.*	.015 / .016
Varnish		
Shoe	*gal.*	1.45
Vulcanizing Ingredients		
Sulphur		
Chloride, drums	*lb.*	.03½/ .04
Rubber	100 *lbs.*	2.00
Telloy	*lb.*	
Vandex	*lb.*	
(See also Colors—Antimony)		
Waxes		
Carnauba, No. 3 chalky	*lb.*	.36 / .36½
2 N.C.	*lb.*	.40 / .41
3 N.C.	*lb.*	.37½/ .38
1 Yellow	*lb.*	.46½/ .47
2	*lb.*	.45½/ .46
Montan, crude	*lb.*	.11 / .11½

United States Golf Ball Imports

	United Kingdom		All Other		Total	
1936	No.	$	No.	$	No.	$
July	37,080	6,224	...	...	37,080	6,224
Aug.	46,224	6,766	...	...	46,224	6,766
Sept.	25,200	4.077	...	...	25,200	4,077
Oct.	21,744	3,052	144	21	21,888	3,073
Nov.	12,960	2,113	...	...	12,960	2,113
Dec.	2,525	441	...	...	2,525	441

World Net Imports of Crude Rubber

Year	U.S.A.	U.K.	Australia	Belgium	Canada	Czecho-slovakia	France	Germany	Italy	Japan	Russia	Rest of the World	Total
1934	439,100	158,500	9,600	9,100	28,400	11,000	50,400	59,300	21,400	69,900	47,300	60,500	964,500
1935	455,757	128,829	9,977	7,593	26,868	11,225	52,322	62,901	23,916	57,589	37,576	56,725	931,278
1936													
Jan.	33,260	4,573	1,260	760	1,758	767	6,770	5,545	1,500*	4,357	467	5,121	66,138
Feb.	33,789	1,271	735	779	1,900	344	6,288	5,257	1,000*	3,305	94	5,268	60,030
Mar.	33,743	1,227	819	1,033	1,809	410	4,342	4,568	1,000*	5,172	4,376	5,433	61,478
Apr.	44,949	2,097	969	1,097	1,079	603	4,261	5,497	1,500*	4,931	3,251	4,723	70,763
May	35,549	302	1,053	698	2,221	667	4,342	4,639	1,000*	5,531	4,220	4,380	64,602
June	35,901	1,493	1,693	579	2,042	323	4,860	5,698	1,500*	4,567	2,427	4,176	62,273
July	38,556	766	1,455	713	2,274	495	4,631	6,837	2,000*	5,126	1,733	4,532	67,586
Aug.	41,094	1,581	762	789	3,780	989	4,522	6,556	1,500*	4,305	3,128	4,259	70,103
Sept.	49,483	12	2,336	513	2,393	624	4,402	6,006	1,500*	5,197	2,922	5,159	80,523
Oct.	40,301	87	1,124	817	3,110	1,026	4,423	7,232	1,500*	6,602	2,761	5,509	74,318
Nov	37,898	742	997	1,090	4,308	823	3,289	6,500	1,500*	3,934	2,162	5,806	67,565

* Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Shipments of Crude Rubber from Producing Countries

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Siam	French Indo-China	Total	Philippines and Oceania	Africa	South America	Mexican Guayule	Grand Total
1934	467,400	379,400	79,100	6,500	6,300	11,100	17,700	17,700	19,600	1,004,800	1,400	3,500	9,100	400	1,019,200
1935	417,005	282,858	54,316	9,054	4,914	8,885	19,465	28,327	28,677	853,501	1,537*	5,031	12,194	459	872,722
1936															
Jan.	26,637	20,778	4,178	419	880	938	2,317	1,665	2,449	60,261	105	494	1,796	70	62,726
Feb.	19,692	27,991	3,664	871	511	529	2,107	3,663	2,894	61,922	225	620	1,177	75	64,019
Mar.	34,597	19,403	4,336	750	574	342	1,848	2,966	2,553	67,369	133	535	1,175	40	69,252
Apr.	21,667	25,255	3,172	413	817	869	2,053	1,596	2,416	58,258	92	533	1,044	103	60,030
May	34,108	22,121	2,560	632	485	517	2,354	2,077	2,282	67,136	103	493	1,018	88	68,838
June	25,115	26,401	3,766	673	553	461	1,386	3,737	2,733	64,825	153	456	947	97	66,478
July	34,214	33,911	3,773	1,048	311	1,035	1,399	3,734	2,738	82,163	155	423	1,013	96	83,850
Aug.	30,253	25,313	3,940	655	121	656	2,541	3,284	3,017	69,780	162	444	681	146	71,213
Sept.	34,160	21,835	5,367	588	76	537	1,139	3,259	3,505	70,466	164	508	1,070	106	72,314
Oct.	33,591	28,777	5,599	809	372	1,086	2,143	3,349	3,874	79,600	162	593	1,287	114	81,756
Nov.	30,549	30,476	4,960	607	698	701	1,950	2,260	3,872	76,073	160*	550*	1.663	159	78,605
Dec.	29,119	27,471	4,377	1,201	461	506	....	2,988	8,497	74,620	160*	550*	1,761	150*	77,241

*Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE—Continued

FOR SALE: ENTIRE EQUIPMENT CEMENT BALLOON FACTORY. Mixers, dipping tanks, rollers, take-off machines, curing oven, tumblers, etc. Address Box No. 787, care of INDIA RUBBER WORLD.

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WANTED: 10 GALLON WEIGHTED HYDRAULIC ACCUMULATOR, 1,500 to 2,000 lb. operating pressure, with or without pump. Also 15 gallon vertical hydraulic pump, motor driven preferred, 3,000 lb. operating pressure. Address Box 27, Arlington, N. J.

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Crude Rubber
Liquid Latex
Carbon Black
Crown Rubber Clay

Stocks of above carried at all times

BOSTON MASS.

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MORRIS TRIMMING MACHINES *The World's Trimmers*

T. W. MORRIS

6312 WINTHROP AVENUE CHICAGO, ILL.

Precipitated Surinam Balata

for Golf Ball Manufacturers. 99 and 54/100 per cent free from resins. Purer and cheaper than you can produce it. You also avoid fire hazards.

Sample and price on request.

HUNTINGDON MANUFACTURING Co. Meadowbrook, Pa.

CORONA GOLF BALL WINDING MACHINES

Used everywhere by manufacturers. Rented on a monthly basis in U. S. Sold outright in foreign countries.

Illustrated circular on request.

Corona Manufacturing Company

Mount Airy, Philadelphia, Pa., U. S. A.

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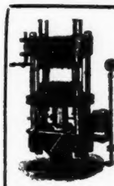

PLASTICS MOLDING PRESSES

Plain or Semi-automatic—Any Size or pressure—Pumps, Valves, etc.

Dunning & Boschert Press Co., Inc.

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India Rubber World
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SOLE PRODUCERS

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Having our own machine shops we are fully prepared to offer thoroughly rebuilt and guaranteed:—

ACCUMULATORS	MIXERS	PUMPS
CALENDERS	CHURNS	SPREADERS
CUTTING MACHINES	MOTORS	TUBERS
MILLS	PRESSES	VULCANIZERS

L. ALBERT & SON

Offices and Warehouses

336 Whitehead Road, TRENTON, N. J. Adams, Arch and Union Streets, AKRON, O.

European Office and Representative—Mr. Andre Berjonneau, #33 Blvd. des Batignolles, 33, Paris (VIII) France.

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	November, 1936		Eleven Months Ended November, 1936	
UNMANUFACTURED—*Free*	Pounds	Value	Pounds	Value
Crude rubber	82,392,079	$12,788,704	935,729,558	$134,515,189
Liquid latex	3,654,392	578,729	39,833,205	5,924,743
Jelutong or pontianak	907,879	91,538	12,598,931	1,187,156
Balata	97,382	19,408	1,167,412	192,121
Gutta percha	291,647	49,177	3,143,701	509,883
Guayule	357,000	43,980	2,453,100	249,580
Siak, scrap, reclaimed, etc.	1,351,190	27,406	12,403,183	269,605
Totals	89,051,569	$13,598,942	1,007,329,090	$142,848,277
Chicle, crude ... *Free*	92,606	$22,467	5,458,453	$1,306,056
MANUFACTURED—*Dutiable*				
Rubber tires ... *number*	10,619	$3,928	76,639	$327,446
Rubber boots, shoes, and overshoes ... *pairs*	4,108	815	59,937	10,847
Rubber soled footwear with fabric uppers ... *pairs*	39,552	15,745	942,236	222,796
Golf balls ... *number*	12,960	2,113	528,018	83,695
Lawn tennis balls ... *number*	144	11	407,659	40,112
Other rubber balls ... *number*	118,948	3,697	4,184,098	131,598
Other rubber toys, except balls	95,695	12,469	1,107,990	134,606
Hard rubber combs ... *number*	59,904	3,826	787,074	46,690
Other manufactures of hard rubber	......	2,428	......	27,346
Friction or insulating tape	32,586	1,601	331,387	16,662
Belts, hose, packing, and insulating material	......	9,622	......	179,718
Druggists' sundries of soft rubber	......	5,163	......	81,152
Inflatable swimming belts, floats, etc. ... *number*	4,104	270	660,950	36,021
Other rubber and gutta percha manufactures ... *lb.*	69,601	18,328	1,287,279	245,720
Totals	......	$80,016	......	$1,584,409

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber	1,513,108	$241,982	26,665,304	$4,220,478
Balata	62,132	19,113	266,775	73,963
Gutta percha, rubber substitutes, and scrap	14,254	2,632	120,170	11,211
Rubber manufactures	......	1,164	......	15,421
Totals	......	$264,891	......	$4,321,073

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed	1,145.686	$56,497	14,270,695	$647,643
Scrap	1,203,898	27,908	36,255,090	666,064
Cements ... *gal.*	12,154	10,394	199,447	174,749
Rubberized automobile cloth, *sq. yd.*	29,484	14,299	455,440	212,541
Other rubberized piece goods and hospital sheeting ... *sq. yd.*	84,619	37,916	1,095,636	444,482
Footwear				
Boots ... *pairs*	4,219	10,528	64,885	143,508
Shoes ... *pairs*	7,060	6.414	191,380	86,120
Canvas shoes with rubber soles ... *pairs*	20,243	9.037	198,760	114,052
Soles ... *doz. prs.*	2,748	5,198	24,656	45,656
Heels ... *doz. prs.*	32,359	18,653	376,604	232,809
Soling and top lift sheets	27,709	4,448	397,763	75,260
Gloves and mittens ... *doz. prs.*	5,371	10,703	58,029	127,951
Water bottles and fountain syringes ... *number*	21,473	6,542	249,543	89,106
Other druggists' sundries	......	38,561	......	468,976
Gum rubber clothing ... *doz.*	20,798	33,867	169,606	249,257
Balloons ... *gross*	50,666	43,405	367,589	327,801
Toys and balls	......	25,767	......	133,867
Bathing caps ... *doz.*	1,751	1,860	54,897	88,561
Bands	17,414	6,634	216,102	78,313
Erasers	28,348	14,758	334,631	191,902
Hard rubber goods				
Electrical hard rubber goods	......	17,529	......	193,801
Other hard rubber goods	......	16,069	......	231,904
Tires				
Truck and bus casings, *number*	10,887	221,029	160,725	3,206,262
Other automobile casings, *number*	47,556	493,221	624,784	5,806,310
Tubes, auto ... *number*	34,810	50,896	549,486	847,330
Other casings and tubes, *number*	3,165	11,511	45,879	202,869
Solid tires for automobiles and motor trucks ... *number*	258	7,523	4,418	122,753
Other solid tires	62,535	9,190	1,014,970	158,036
Tire sundries and repair materials	......	49,391	......	581,149
Rubber and friction tape	59,066	12,707	618,531	166,251
Belts and belting	189,271	106,942	2,396,580	1,260,327
Hose	325,793	104,803	4,348,793	1,501,834
Packing	135,750	50,468	1,383,410	581,671
Mats, matting, flooring, and tiling	84,793	11,329	1,268,330	173,847
Thread	73,803	36,752	779,695	444,242
Gutta percha manufactures	97,629	23,018	937,445	246,138
Other rubber manufactures	......	97,366	......	1,004,315
Totals	......	$1,703,133	......	$21,327,657

Rubber Goods Production Statistics

		1936 Nov.	1935 Nov.
TIRES AND TUBES*			
Pneumatic casings			
Production	*thousands*	4,969	3,997
Shipments, total	*thousands*	4,232	3,990
Domestic	*thousands*	4,162	3,913
Stocks, end of month	*thousands*	10,814	8,249
Inner tubes			
Production	*thousands*	4,739	3,942
Shipments, total	*thousands*	3,995	3,747
Domestic	*thousands*	3,948	3,688
Stocks, end of month	*thousands*	10,732	8,161
Raw material consumed			
Fabrics	*thous. of lbs.*	21,744	16,695
MISCELLANEOUS PRODUCTS			
Single and double texture proofed fabrics			
Production	*thous. of yds.*	3,672	2,874
Rubber and canvas footwear			
Production, total	*thous. of prs.*	6,496	5,172
Tennis	*thous. of prs.*	1,461	1,301
Waterproof	*thous. of prs.*	5,035	3,871
Shipments, total	*thous. of prs.*	6,502	5,657
Tennis	*thous. of prs.*	588	491
Waterproof	*thous. of prs.*	5,914	5,165
Shipments, domestic, total	*thous. of prs.*	6,464	5,626
Tennis	*thous. of prs.*	557	467
Waterproof	*thous. of prs.*	5,908	5,159
Stocks, total, end of month	*thous. of prs.*	**13,425**	**14,200**
Tennis	*thous. of prs.*	4,654	5,571
Waterproof	*thous. of prs.*	8,771	8,630

*Data for January to July, 1935, are estimated to represent approximately 97% of the industry; for August, September, October, November, and December, 1935, the coverage is estimated to be 81%.

Source: *Survey of Current Business,* Bureau of Foreign & Domestic Commerce, Washington, D. C.

Imports by Customs Districts

	December, 1936 *Crude Rubber		December, 1935 *Crude Rubber	
	Pounds	Value	Pounds	Value
Vermont	......	......	107	$ 17
Massachusetts	11,215,117	$1,833,781	8,916,617	1,025,881
New York	81,539,206	12,944,663	62,166,501	7,257,397
Philadelphia	2,723,445	407,394	1,785,160	214,466
Maryland	5,772,037	906,145	3,585,928	412,028
Georgia	108,655	16,712	......	......
New Orleans	2,595,661	399,606	961,926	97,442
Los Angeles	9,156,543	1,454,643	11,444,488	1,279,584
San Francisco	379,532	52,529	307,400	33,864
Oregon	......	......	11,168	1,367
Ohio	117,417	14,616	461	50
Colorado	1,786,984	297,744	......	......
Totals	115,394,597	$18,327,833	89,179,756	$10,322,096

*Crude rubber including latex dry rubber content.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	INQUIRY
2244	Manufacturer of rubber collapsible boats.
2245	Supplier of gutta percha rosin.
2246	Information wanted on "Crackerjack" belting.
2247	Manufacturer of "Xylol."
2248	Manufacturer of rubber belt guard.
2249	Manufacturer of air bomb aging apparatus.
2250	Supplier of latex compound for insulating paper.
2251	Manufacturer of transparent rubber sheeting.
2252	Manufacturer of rubber door knob protectors.
2253	Supplier of "Jaytex."
2254	Information wanted on boring ¼-inch holes in medium hard rubber.
2255	Manufacturer of rubber doilies.
2256	Supplier of smoked sheet and crepe rubber.
2257	Supplier of hard rubber and ebonite.
2258	Manufacturer of molded rubber metatarsal pads.
2259	Supplier of fabric-backed sponge rubber sheeting.
2260	Manufacturer of seven-inch diameter flat rubber suction-type sink stopper.
2261	Manufacturer of rubber head tack bumpers of non-blooming stock for toilet seats.
2262	Information wanted on the technologic use of plastic rubber compounds.
2263	Supplier of Taylor Ink, used as a mold dressing.
2264	Supplier of hard rubber in sheets, tubes, and rods.
2265	Supplier of celluloid.
2266	Supplier of casein.
2267	Manufacturer of tools for tapping rubber trees.